Developed from solid rocket fuel technology, Pyrogen is designed to protect a variety of electrical cabinets, like switchgear, MCC and VSD cabinets. It almost instantly extinguishes the fire, using a cool discharge to prevent re-ignition.

We believe it to be one of the safest, most effective and widely used solution on the market.

CALL US FOR MORE INFORMATION
CALL: +27 (0) 11 949 1157
EMAIL: SALES@ASTAFRICA.COM

THE FUTURE OF FIRE SUPPRESSION TECHNOLOGY IS HERE.
WWW.ASTAFRICA.COM
Over the last few years, the terms M2M, IoT, IIoT and Industry 4.0 have become commonplace. Adroit Technologies has understood the unique challenges of these new technologies and is now in a position to deploy them to add value for customers. See this month’s cover story on page 24.

### REGULARS

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>04</td>
<td>News digest</td>
</tr>
<tr>
<td>06</td>
<td>News &amp; events</td>
</tr>
<tr>
<td>14</td>
<td>Training</td>
</tr>
<tr>
<td>16</td>
<td>SAIMC news</td>
</tr>
<tr>
<td>21</td>
<td>System integrators</td>
</tr>
<tr>
<td>78</td>
<td>Product news</td>
</tr>
</tbody>
</table>

### FEATURES

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover story</td>
<td>24</td>
</tr>
<tr>
<td>Scada Review</td>
<td>26</td>
</tr>
<tr>
<td>Mining &amp; metals</td>
<td>36</td>
</tr>
<tr>
<td>Process measurement</td>
<td>42</td>
</tr>
<tr>
<td>IT in manufacturing</td>
<td>50</td>
</tr>
<tr>
<td>Electrical power &amp; efficiency</td>
<td>54</td>
</tr>
<tr>
<td>Wireless &amp; telemetry</td>
<td>60</td>
</tr>
<tr>
<td>Control systems</td>
<td>62</td>
</tr>
<tr>
<td>Condition monitoring</td>
<td>75</td>
</tr>
</tbody>
</table>

- **Cover story**: Adroit brings M2M, IoT and IIoT to the industrial world
- **Scada Review**: AVEVA Schneider Electric, Adroit Technologies
- **Mining & metals**: Endress+Hauser, Rockwell Automation, TLT-Turbo Africa, SKF South Africa, Siemens Digital Industries
- **Process measurement**: Krohne SA, Turck Banner, Endress+Hauser, SICK Automation Southern Africa, Festo, R&C Instrumentation, WIKA Instruments
- **IT in manufacturing**: ARC Advisory Group, Siemens Digital Industries, Omron Electronics
- **Electrical power & efficiency**: Phoenix Contact, HellermannTyton, Zest WEG Group Africa, Vert Energy, BMG, RS Components SA
- **Wireless & telemetry**: RJ Connect, Omniflex, Axiz
- **Control systems**: Beckhoff Automation, SICK Automation Southern Africa, Phoenix Contact, Festo, Michael Brown Control Engineering, Schneider Electric SA, SEW-Eurodrive, Sasisa, Mimic Components, AC/DC Dynamics
- **Condition monitoring**: R&C Instrumentation, Comtest, Emerson Automation Solutions
Edge, cloud or both?

In the illusory world of digital transformation, the question of where the applications will best be hosted often triggers a lively discussion. In particular, the cloud vs. edge debate has left many wondering which direction to choose. Turns out, the answer is not as clear-cut as picking one over the other in the hope of finding a winner. It is a case of ‘horses for courses’ and an efficient enterprise-wide implementation may well require elements of both.

Wikipedia defines edge computing as a distributed paradigm that brings data storage and processing closer to the location where it is needed – the shop floor, for instance. Cloud computing, on the other hand, is generally considered as on-demand access to computer resources available to many different users over the Internet – the data centre.

As an Industry 4.0 platform, cloud applications offer almost unlimited scalability in terms of data storage and computing power. This makes it easy to run data mining and analytics algorithms on plant data with a view to optimising overall process and energy efficiency. It also offers older plants running legacy equipment an easy way to get started with the new technologies of the IIoT. One of the downsides of cloud-based systems is the inherent latency, which is fine for any application in which ‘near’ real-time response is acceptable, but not so good for machine applications that require a true real-time reaction.

A DCS is an example of an edge system (before the term became popularised), but in an IIoT context, edge computing comes into its own where the value of the system is linked to its reaction time. Artificial intelligence and machine learning are good applications.

An example of how artificial intelligence can be incorporated into machines through the use of sensors and data processing at the edge is Forpheus, Omron’s ping-pong playing robot. Forpheus uses its cameras and sensors to observe the movements of the opponent, as well as the trajectory of the ball. It then rapidly analyses this data to anticipate the opponent’s next shot so that it can hit the return. Through this constant assessment of a person’s play, it determines their skill level and modifies its own game to present an appropriate challenge. Forpheus’ objective is not to beat the other player, but to gauge their skill level and then help them to train and improve. This is an example of how smart machines could be used to assist people to make the most of their potential.

Although edge computing has a distinct advantage over the cloud in these types of application, this does not make it a substitute. For instance, predictive maintenance is a natural target for cloud deployment because there is simply no need for a ‘zero latency’ response. See the article on page 52 for more on the cloud vs edge conundrum, and how the two will most likely coexist in the future.

Steven Meyer
Editor: SA Instrumentation & Control
steven@technews.co.za

Managing Editor
Graeme Bell
NHD Elec Eng (L.C.), MBA
gbell@technews.co.za

Editor
Steven Meyer
BSc (Elec Eng), IMMM (Unisa)
steven@technews.co.za

Deputy Editor
Kim Roberts
MSc Chem
kimroberts@technews.co.za

Contributing Editors
Michael Brown
BSc (Eng) (Rand), CEng MIEE MSAIEE
Gavin Halse
BSc Chem Eng
Oratile Sematle
BSc Elec Eng, MBA
Lance Turner
BSc (Hons) Information Systems

Advertising
Sales manager
Jane van der Spuy
janec@technews.co.za
Tel: +27 31 764 0593
Laura van der Merwe
laura@technews.co.za
Tel: +27 11 543 5806
Melissa Simons
melissa@technews.co.za
Tel: +27 11 543 5818

Design and Layout
Technews Production Department
Tel: +27 31 764 0593

Subscription Services
For address changes, subscriptions, renewal status or missing issues, call +27 11 543 5800, subs@technews.co.za or write to: Technews Publishing (Pty) Ltd, Box 385, Pinetown 2123

Subscribe Online
www.technews.co.za

Publishers
Technews Publishing (Pty) Ltd, Box 385, Pinetown 2123

Letters to the Editor
Letters to the editor should be addressed to Steven Meyer at steven@technews.co.za. Sending material to this publication will be considered automatic permission to use in full or in part in our Letters column. Be sure to include your name, e-mail address, city and zip code. We reserve the right to edit all letters.

All rights reserved. No part of this publication may be reproduced, adapted, stored in an retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of Technews Publishing (Pty) Ltd. Reg. No. 2005/034/817
“MADE IN SOUTH AFRICA, ALWAYS IN STOCK!”

DIAPHRAGM SEAL SOLUTIONS

Standard or tailor made - fitted to gauges, transmitters & switches.

Diaphragm seals with threaded, flanged or clamped process connections for the food & dairy, pharmaceutical, petrochemical, chemical and other industries.

Wetted parts with s/steel 316, PTFE, tantalum or other exotic materials.

DIAPHRAGM SEAL REPAIRS

Refurbishment to original standards at a fraction of the cost.

Pressure & Temperature Accredited
SANAS ISO/IEC 17025 calibration laboratory

SA Gauge (Pty) Ltd  Int +27 (0) 31 579 2216  National 0860 007 911
sales@sagauge.com  www.sagauge.com
According to a new research report from Berg Insight, the number of devices featuring cellular or satellite connectivity deployed in oil and gas applications amounted to 1,3 million at the end of 2018. Growing at a compound annual rate of 6,8%, this number is expected to reach 1,9 million units by 2023. Remote monitoring of tanks and industrial equipment in the midstream and downstream sectors comprise the most common applications for wireless solutions in the oil and gas industry.

Major automation vendors are investing heavily in the development of software platforms to support use cases surrounding predictive analytics and digital twins. While on the communications side, leading cellular device providers, together with spectrum licensees and utilities formed the Utility Broadband Alliance (UBBA) to advance the development of private LTE networks for critical infrastructure industries.

In a move that takes the roadmap for rebuilding Iraq’s power sector a step further, Siemens and the Ministry of Electricity of the Republic of Iraq have signed an implementation agreement. This builds on the exclusive Memorandum of Understanding signed between the ministry and Siemens in October last year, and outlines the specific projects, associated budgets and timelines for the execution phase, covering all essential elements of the electrification of Iraq. The document was signed in Berlin by Joe Kaeser, president and CEO of Siemens, and Luay Al-Khatteeb, Iraq’s Minister of Electricity.

The ‘Siemens Roadmap for the Electrification of the New Iraq’ is a series of short, medium and long-term plans designed to meet the reconstruction goals and support the country’s economic development. Along with the electrification scope, Siemens had also committed to the donation of a smart health clinic, a $60 million software grant for universities of Iraq, and the training of more than 1000 Iraqis in vocational education.

Emerson has announced the acquisition of KnowledgeNet (KNet) software from Tunisia-based Integration Objects. KNet’s unique analytics application software accelerates digital transformation initiatives for process and hybrid industries. KNet is used to extract, clean, transform and analyse operational and manufacturing data. Using libraries of advanced statistical and machine-learning algorithms, the software consumes large quantities of diverse information technology (IT) and operational technology (OT) data into actionable knowledge that drives real-time decisions to improve process and asset performance. KNet will be integrated with Emerson’s leading Plantweb digital ecosystem, which helps customers deliver measurable business outcomes from digital transformation initiatives. Combined with Emerson’s extensive Failure Modes and Effects Analysis (FMEA) Library and consulting services, KNet will enhance the comprehensive analytics solution Emerson offers to its customers.
Kanreki Celebrations
SMC 60th Birthday

#SMC RaisesTheBar
Join the conversation on SMC Corporation (South Africa) and SMC Corporation (South Africa)
BI set to add ContiTech belts to its range

Bearings International (BI) is set to add to its basket of premium brands following a visit by the ContiTech Power Transmission Group to discuss a local distribution agreement for its belt ranges. These are designed to minimise vibration and belt whip, especially in heavy-duty shock-load applications. The banded or joined construction prevents rollover and reduces vibration tendencies. Productivity is maximised by eliminating groove mismatch or belt turnover problems, which are common on drives with a combination of long belt spans and/or pulsating loads.

ContiTech also manufactures specialty belts for constant speed delivery and excellent rigidity, while retaining flexibility and strong gripping traction. Power transmission belts are supplied in traditional, classic, and narrow-profile V-belt forms, with particular attention paid to features such as total lifetime cost, quiet running, and increased efficiency.

Karl Weindinger, general manager sales for Western Europe and Africa, recently paid a visit to BI’s Johannesburg head office to commence discussing the details of the potential distributorship. “As a global belt manufacturer, we rely on key partners to import and distribute our products,” he explained. “We are excited at the prospect of strengthening our cooperation with the BI family, which represents some of the top global brands.”

Weindinger emphasised that BI’s centralised warehouse, well-established customer base in a range of industries, technical expertise, and a full product range, make it an ideal partner for ContiTech.

Brian Tillie, BI chain and belt transmission drives product manager, added that the tie-up will allow the company to diversify even further into additional market sectors, as well as boost the credibility of its premium product focus. “The main features of ContiTech’s products are their long life and guaranteed performance, in addition to the low total cost of ownership,” concluded BI marketing manager, Victor Strobel. “This is increasingly important to our industrial clients where costly downtime can be minimised by using quality products.”

For more information contact Bearings International,
+27 11 899 0000, info@bearings.co.za,
www.bearings.co.za

Endress+Hauser expands patent portfolio

The number of patents submitted by the Endress+Hauser Group continues to rise. As reported during the annual Innovators’ Meeting held this year in France, the Group submitted 287 initial patents in 2018, a new record. Endress+Hauser owns nearly 7800 active intellectual property rights worldwide.

Angelika Andres, corporate director, Intellectual Property Rights at Endress+Hauser, is pleased with the most recent activities: “This year we once again achieved a record number of innovations, both in the number of patent filings and the number of approved patents.”

While the 309 invention disclosures are a sign of the company’s ongoing innovation capability, the 537 granted patent applications also represent an all-time high. Roughly one-third of the patent filings are related to the Industrial Internet of Things, digital communications and instrument diagnostics. Under the motto #empowerthefield, in 2018 the measurement engineering specialist began to bundle its digital activities with a focus on Heartbeat Technology, as well as the recently introduced Netilion IIoT ecosystem.

Patent department in the US
Each invention undergoes a multistage internal evaluation process before submission to the patent office, usually within four months. To handle the stream of innovations, an internal patent department was created in the US, one of the Group’s most important markets. Four specialists at the Greenwood, Indiana location are responsible for protecting the technical innovations. This team has full responsibility for handling all patent filings from the Group companies located in the US, plus up to 80% of the overseas filings.

Innovation spirit in the spotlight
Under the motto ‘Innovation – what makes us human’, Matthias Altendorf, CEO of the Endress+Hauser Group, as well as other members of the executive board, welcomed more than 300 guests to the annual Innovators’ Meeting, which was held in late March in Saint-Louis, France. Employees involved in patent filings presented their innovations during the company’s traditional get-together, where exceptional innovations were recognised with special awards.

For more information contact
Natlee Chetty, Endress+Hauser,
+27 11 262 8000, info@za.endress.com,
www.endress.com

From left: Brian Tillie, Victor Strobel and Karl Weindinger.
The Engineering Solutions Group (ESG) of Invicta Holdings has incorporated Hyflo Southern Africa into BMG’s Fluid Technology Division. This development is a positive move for both companies and for the local fluid power sector, which will benefit from the combined services of two streamlined organisations.

“As part of this restructure programme, all Hyflo’s customer and supplier trading activities will be integrated into BMG, yet Hyflo will retain its brand presence in the market,” says Wayne Holton, business unit manager, Fluid Technology Division, BMG. “The Hyflo team is excited to be part of BMG. We are confident that with access to BMG’s central support functions, including engineering, technical expertise and manufacturing skills, we can further improve service levels to our loyal customer base.

“ Apart from new customers and markets which are being leveraged through BMG, we are rolling-out our Hyflo product offering through BMG’s network of 106 branches, thereby enhancing sales and creating new opportunities for both companies.”

Hyflo’s operations in Bloemfontein, Cape Town and Vredenburg will continue to operate from their current locations, but these branches will eventually become BMG Regional Service Centres (RSCs), each with a focus on engineering, sales support and the manufacture and repair of hydraulic systems, pumps, cylinders and associated products.

Hyflo’s Durban, Johannesburg and Port Elizabeth branches are being absorbed into BMG’s existing RSCs in these regions.

All Hyflo systems will continue to be manufactured according to stringent quality and safety standards, as required by customers in diverse industries, including mining and quarrying, manufacturing, agriculture, marine and off-shore services, as well as general engineering.

BMG’s fluid technology services – incorporating Hyflo’s products and expertise – encompass project engineering and consulting, cylinder design and manufacture, training, repair and testing, as well as on-site container services. BMG also offers total process and lubrication management solutions throughout the African continent.

For more information contact Lauren Holloway, BMG,
+27 11 620 7597, laurenhy@bmgworld.net, www.bmgworld.net
MESA Africa has aligned with Africa Automation Fair for the first time this year, to help drive the next level of industry automation in South Africa. Vice chairman, Gerhard Greeff, explains that MESA’s focus is on the layer above plant automation, extending to the systems that connect, optimise and analyse all aspects of manufacturing, such as production, inventory, maintenance, and quality operations. “We have aligned with Africa Automation Fair 2019 because of its focus on Industry 4.0, which encompasses more of the base technologies and models we believe to be crucial for manufacturers today, and in the future,” he adds.

Greeff says South African industry and manufacturers are generally on par with those in Europe and the US in that some are at the ‘bleeding edge’ and some lag: “There is a great deal of automation in place in African manufacturing plants, but you may find that while the plant is automated, the manufacturer is still managing the books on Excel spreadsheets, or there is an ERP system in place, but the factory is being operated manually. In many, you’ll find that they are unable to track and analyse the factors that impact on production throughput and product quality. In next generation industry automation, all stakeholders, departments and processes are connected and automated to optimise operations across the entire production ecosystem.”

Unlike certain other first-world countries, South Africa does not have Industry 4.0 initiatives driven and funded by government, in which stakeholders collaborate and share best practice to progress industry as a whole. In addition, South Africa is challenged in terms of the skills available to advance Industry 4.0 optimisation. “We don’t yet have formal automation degree qualifications at our local universities, although work is being done in this regard,” says Greeff. “And like many countries around the world, we lack data science and analytics skills, which are crucial to optimising manufacturing in the future.”

To advance South Africa’s Industry 4.0 agenda, Greeff believes stakeholders should begin actively sharing knowledge and upskilling their workforces now. MESA, which works to educate and share knowledge on operations excellence, will participate in Africa Automation Fair to showcase its membership benefits and the information resources it has available to the sector.

Marius Smit, event organiser at Africa Automation Fair presenters, Reed Exhibitions, says the partnership with MESA is in line with the efforts to bring Industry 4.0 solutions, information, skills development, enhanced education and best practice knowledge sharing to the event.

For more information contact Festo Events, +27 11 971 5560, events.za@festo.com, www.festo.co.za

For more information contact Leigh Angelo, Reed Exhibitions, +27 11 869 9153, leigh@tradeprojects.co.za, www.africaautomationfair.com
Siemens Digital Industries (DI) is an innovation leader in automation and digitalization. Closely collaborating with partners and customers, DI drives the digital transformation in the process and discrete industries. With its Digital Enterprise portfolio, DI provides companies of all sizes with an end-to-end set of products, solutions and services to integrate and digitalize the entire value chain. Optimized for the specific needs of each industry, DI’s unique portfolio supports customers to achieve greater productivity and flexibility. DI is constantly adding innovations to its portfolio to integrate cutting-edge future technologies.

Join Siemens at the Africa Automation Fair 2019
04-06 June 2019
Ticketpro Dome
Stands: G10,G11,H05,H06

Endress+Hauser’s Water & Wastewater technology bus will embark on an exciting roadshow, visiting water and wastewater plants across South Africa.
Endress+Hauser’s Water & Wastewater technology bus will embark on an exciting roadshow, visiting water and wastewater plants across South Africa. COMING SOON to a site near you!

Driving Technology

marketing@za.endress.com  |  www.endress.com  |  +27 11 262 8000
At Hannover Messe 2019, seven leading suppliers from mechanical engineering, industrial automation and software announced the founding of the Open Industry 4.0 Alliance. With this cooperation, the companies want to overcome proprietary solutions and give a decisive boost to the digital transformation of the European industry.

Founding members of the alliance are Beckhoff Automation, Endress+Hauser, Hilscher, ifm electronic, Kuka, Multivac and SAP. In principle, the alliance is open to all companies: Balluff, Gebhardt, Pepperl+Fuchs, Schmidtsche Schack, Samson and WIKA have already joined as members. All member companies are committed to the creation of a standardised and open ecosystem for the operation of highly automated factories and process plants, with the integration of logistics and services.

"The architecture of the Open Industry 4.0 Alliance meets all the requirements of the process industry," emphasised Matthias Altendorf, CEO of the Endress+Hauser Group. "It is based on standards, ensures transparency across all business processes and guarantees the integrity of the systems. This enables process plant operators to leverage the potential of digitalisation."

Focus on implementation and benefits

The alliance members are planning to realise a so-called Open Industry 4.0 Framework based on existing standards such as I/O Link, OPC UA and RAMI for the entire route from objects in the workshop to services. Customers can choose from a modular system of compatible and scalable solution and service components, such as digital services from Endress+Hauser’s Netilion IIoT ecosystem.

The connection to the SAP software portfolio ensures the integration of a company's business processes as well as collaboration with partners across company boundaries. The open architecture allows the simple connection of further system landscapes.

For more information contact Natlee Chetty, Endress+Hauser, +27 11 262 8000, info@za.endress.com, www.endress.com

---

Future Production Technologies Conference

“The Fourth Industrial Revolution will herald the transformation of entire systems of production, management and governance,” says Bob Williamson, chair of the Future Production Technologies Conference taking place in Cape Town on 31 July and 1 August.

“There is already much hype around the rapid advances in technology and the disruptive change 4IR will bring, and the potential,” adds Williamson. “The challenge facing manufacturers in South Africa is grasping and understanding the complex technologies and how these integrate into their manufacturing systems.”

To help delegates understand how 4IR will affect their businesses, experts will present overviews of the different technologies, their application and how these can be integrated into a company’s manufacturing system, including robotics, AI, nanotechnology, quantum computing, biotechnology, IoT, 3D printing and autonomous vehicles.

In addition, there will be interactive discussion sessions with manufacturing CEOs, production engineers, entrepreneurs and economists discussing the economic impact of 4IR and the future outlook for manufacturing in South Africa.

The event is hosted by the Production Technologies Association South Africa in association with Instimbi, NTiP and SBS Conferences & Exhibitions, and the support of BRICS, DTI, SAIME and SAEEC.

For more information contact Peter Aspinall, SBS Conferences & Exhibitions, +27 83 250 5083, peter@sbs.co.za, www.sbs.co.za/ptc2019
Siemens has launched a new web-based application that reveals the readiness and potential of six major cities to embrace digitalisation and develop new ways of living, working and interacting. The Atlas of Digitalisation focuses on three interconnected themes – mobility, sustainability and opportunity – and assesses how the Fourth Industrial Revolution has already augmented urban life around the world, and the potential impact it could have in the future.

Data from 21 indicators has been analysed in Dubai, Los Angeles, London, Buenos Aires, Taipei and Johannesburg to produce a Digital Readiness Score, considering areas such as smart electricity and transport systems, Internet connections and digital governance services. The score reveals the current level of maturity of each city’s digital infrastructure, and its preparedness for a connected future.

“Each city must address its own unique mix of challenges and opportunities by combining the physical and digital worlds; we believe embracing digitalisation is the key to sustainable, livable future cities,” said Sabine Dall’Omo, Siemens CEO for Southern and Eastern Africa. “The Atlas of Digitalisation gives us an all-important understanding of the current status of digitalisation in key cities, and we hope it will inspire new ways of thinking to realise the full global potential of City 4.0. With intelligently-applied technology and data analytics, we aim to shape the smart cities of tomorrow.”

The analysis also considers areas such as innovation, greenhouse gas emissions and time spent in traffic to give the cities a Digital Potential Score, indicating where there is opportunity to grow digital capabilities to transform society and economy. Together, the scores illustrate the different capacities each city already has, and where they can develop to effect change and growth.

While each is unique, they all share one characteristic – their ingenuity in using digital technologies to make infrastructure more efficient and productive, and to address challenges such as air pollution, congestion, population growth and natural hazards.

With the integration of data gathered and analysed by the IoT, a city’s underlying infrastructure can be monitored, managed and improved – a transformation referred to as City 4.0.

Johannesburg’s low digitalisation readiness score of 2/10 indicates that there is room for improvement, even though programs like smart metering are already in place. The digitalisation potential score of 6/10 reveals that digitalisation within mobility and sustainability could have a significant impact. The city is investing heavily to increase overall public transport capacity and has begun the process of including renewables in the energy mix, this could impact the environment and jobs positively.

For more information contact Keshin Govender, Siemens, Southern and Eastern Africa, +27 71 492 3789, keshin.govender@siemens.com, www.siemens.co.za

Johannesburg’s low digitalisation readiness score of 2/10 indicates that there is room for improvement, even though programs like smart metering are already in place. The digitalisation potential score of 6/10 reveals that digitalisation within mobility and sustainability could have a significant impact. The city is investing heavily to increase overall public transport capacity and has begun the process of including renewables in the energy mix, this could impact the environment and jobs positively.

For more information contact Mike Zinn, Skyriders, +27 11 312 1418, mike@ropeaccess.co.za, www.ropeaccess.co.za
On an otherwise ordinary working day during 2015, Wynand Kotzé and Johan Reyneke discussed the ‘challenges’ young people face when making a career choice. They both had children about to finish school who would soon need to start a study or work career.

They decided to launch a technology workshop at the Automation Works premises for a few of the young people of Swellendam during the year’s winter holidays. They visited the two local high schools – Swellendam Secondary and Swellendam High School – to invite learners to attend the planned workshop.

The interest from students was so great that the pair decided to host a formal Technology Winter School in the town’s SSK Lecture Hall, which could accommodate some 50 learners. They invited the Engineering Schools of Stellenbosch University, CPUT, Northlink College, Cape Town School of Engineering (CTSE), Festo and Festo Didactic, Siemens and VEGA to do technology workshops where the learners could get hands-on exposure to modern technology and different career opportunities.

In summary, the Technology Winter School has been running for the past four years in Swellendam, as well as an extra one last year at Northpine Technical High in Cape Town, on request of the WCED. Three Technology Expos at Oakdale, Augsburg and Paarl Boland were also held, which successfully reached 1200 Grade 9 learners of the Western Cape. In addition, a one day Expo for 150 technology teachers in Cape Town was conducted on request of the WCED and the MEC, Minister Debbie Schafer, who attended the 2017 Winter School in Swellendam, herself.

Ten learners are offered the opportunity of a Skills Training Program at Automation Works in Swellendam with the focus on getting them ready to accept job placement opportunities. This has resulted in 30 learners successfully trained; out of which, 24 also found job placements at companies close to their homes.

When Kotzé and Reyneke first discussed the challenges young people face, they never imagined it would lead to this career development vehicle. The lesson learned is that if you believe in something good, don’t wait for funding to materialise from somewhere before you begin. Just get started with what you have, put your heart and soul into it, and the rest will follow in time https://tinyurl.com/y6fc5ua3.

For more information contact Johan Reyneke, Automation Works, +27 28 514 2587, johanr@automationworks.co.za, www.automationworks.co.za

Exps at Oakdale, Augsburg and Paarl Boland

The University of Johannesburg (UJ) recently held a career day for engineers, organised by the student chapter of the SA Institute of Mechanical Engineering. A wide range of representatives from industry were there to meet the students and tell them about the career opportunities open to them. Among the companies making their presence known were BMG, Siemens, Festo, SKF, InBev, Spirax Sarco and Thyssenkrupp. The exhibition was very well attended by the students, who enthusiastically responded to this initiative.

For more information contact Matthew Slabbert, mslabbert1997@gmail.com
BECKHOFF

• Automation Engineers

TwinCAT 3 and TwinCAT 2
Cape Town 2-4 Jul 2019
Johannesburg 9-11 Jul 2019
Port Elizabeth 16-18 Jul 2019

For more information contact Andrew Reinhold,
Beckhoff Automation, +27 11 795 2898,
training@beckhoff.co.za,
http://www.beckhoff.co.za/za/support/training

Endress+Hauser

• Instrument Technicians and Engineers

TC1001 – Process Measurement and Instrument Configuration 1
Sandton 15-19 Jul 2019

TC1002 – Process Measurement and Instrument Configuration 2
Sandton 22-25 Jul 2019

TC1003 – Process Measurement and Instrument Configuration 1 & 2
Sandton 15-25 Jul 2019

For more information contact Nico Marneweck,
Endress+Hauser, +27 11 262 8087,
nico.marneweck@za.endress.com,
www.za.endress.com

FESTO

• Mechatronic Engineers

PN121 – Maintenance Pneumatics
East London 3-5 Jul 2019

PLC282 – PLC Analogue and PID Control
Johannesburg 10-12 Jul 2019

TCM261 – Introduction to Industry 4.0 for Management
Port Elizabeth 15 Jul 2019

For more information contact Sammy Kanye, Festo, +27 11 971 5586,
DidacticTaC.za@festo.com,

PHOENIX CONTACT

• Automation Engineers

IE1 – Industrial Ethernet Seminar
Johannesburg 18 Jul 2019

SCPS1 – Signal Conditioning & Power Solutions Seminar
Cape Town 7 Aug 2019

For more information contact Sheree Britz,
Phoenix Contact, +27 11 801 8200,
sbritz@phoenixcontact.co.za,
https://www.phoenixcontact.com/online/portal/za

SMC

• Mechatronic Engineers

TC-PNEU-E – Electro-Pneumatics
Port Elizabeth 3-5 Jul 2019

TC-PNEU-B – Basic Pneumatics
Johannesburg 10-12 Jul 2019

TC-PNEU-E – Electro-Pneumatics
Durban 31 Jul – 2 Aug 2019

For more information contact Riaan van Eck,
SMC Corporation South Africa, +27 11 100 5866,
rvanek@smcza.co.za, www.smcza.co.za

VEGA

• Automation Engineers

Measurement Solutions – Processing with Level, Pressure and Nucleonic
Roodepoort 20-22 Aug 2019

For more information contact Claudia Olver,
VEGA Controls SA,
+27 73 172 1437,
claudia.olver@vega.com,
http://www.vega.com/

TwinCAT 3 and TwinCAT 2
Cape Town 2-4 Jul 2019
Johannesburg 9-11 Jul 2019
Port Elizabeth 16-18 Jul 2019

For more information contact Andrew Reinhold,
Beckhoff Automation, +27 11 795 2898,
training@beckhoff.co.za,
http://www.beckhoff.co.za/za/support/training

Endress+Hauser

• Instrument Technicians and Engineers

TC1001 – Process Measurement and Instrument Configuration 1
Sandton 15-19 Jul 2019

TC1002 – Process Measurement and Instrument Configuration 2
Sandton 22-25 Jul 2019

TC1003 – Process Measurement and Instrument Configuration 1 & 2
Sandton 15-25 Jul 2019

For more information contact Nico Marneweck,
Endress+Hauser, +27 11 262 8087,
nico.marneweck@za.endress.com,
www.za.endress.com

FESTO

• Mechatronic Engineers

PN121 – Maintenance Pneumatics
East London 3-5 Jul 2019

PLC282 – PLC Analogue and PID Control
Johannesburg 10-12 Jul 2019

TCM261 – Introduction to Industry 4.0 for Management
Port Elizabeth 15 Jul 2019

For more information contact Sammy Kanye, Festo, +27 11 971 5586,
DidacticTaC.za@festo.com,

PHOENIX CONTACT

• Automation Engineers

IE1 – Industrial Ethernet Seminar
Johannesburg 18 Jul 2019

SCPS1 – Signal Conditioning & Power Solutions Seminar
Cape Town 7 Aug 2019

For more information contact Sheree Britz,
Phoenix Contact, +27 11 801 8200,
sbritz@phoenixcontact.co.za,
https://www.phoenixcontact.com/online/portal/za

SMC

• Mechatronic Engineers

TC-PNEU-E – Electro-Pneumatics
Port Elizabeth 3-5 Jul 2019

TC-PNEU-B – Basic Pneumatics
Johannesburg 10-12 Jul 2019

TC-PNEU-E – Electro-Pneumatics
Durban 31 Jul – 2 Aug 2019

For more information contact Riaan van Eck,
SMC Corporation South Africa, +27 11 100 5866,
rvanek@smcza.co.za, www.smcza.co.za

VEGA

• Automation Engineers

Measurement Solutions – Processing with Level, Pressure and Nucleonic
Roodepoort 20-22 Aug 2019

For more information contact Claudia Olver,
VEGA Controls SA,
+27 73 172 1437,
claudia.olver@vega.com,
http://www.vega.com/
We have reached the half-way point of 2019 and I am shocked at how time has just flown by for me personally. But, that is usually the result when you are fully engaged and busy with things that occupy your mind and align with your interests.

Today I want to talk about something different. As the president, I have the privilege of being invited to many conferences and discussions around the future of technology. What I have realised, is that there are end users who are not 100% on top of the new technologies with regard to infrastructure in the IT environment. Of course they attend these conferences to educate themselves, but personally, I do not think you should leave the infrastructure knowledge to other parties as this could cost you money in the long run.

Knowing how to manage your legacy systems and making decisions on how to maintain and support them while developing new systems is a balance, which can end up being costly if it goes wrong.

Keeping this in mind, I urge you to look at some basics again. Maybe you understand them and just need to see what has changed: concepts like Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Docker technology, Kubernetes, and the changes that will come with IPv6. Restructure your organisation to be future-proof. As an individual, you should also educate yourself to ensure that you stay relevant and can contribute to effective decision making.

New laws like the PoPI act have also changed the constraints and use of information. Make sure you know the risks, but also understand the new opportunities that have opened up for you.

The world is changing at a rapid pace – don’t get left behind.

Yours in automation,
Annemarie van Coller.
The May technology evening was moved out a day to accommodate the public holiday on 1 May and the topic of IO-Link attracted an excellent attendance at the Durban Country Club, in spite of the disruption to traffic in central Durban due to strike action by municipal workers. Robert de Scande, SICK Automation’s product manager for Presence Detection and Motion Control Sensors, presented to us and provided the meeting with background information about IO-Link, and how it may be used in conjunction with existing bus systems. He gave examples of how it can benefit the factory automation industry by making information that is already available in many plant-mounted devices available to users at low cost. A further advantage is that the master can be programmed so that if a field device is replaced, the new one will take the required characteristics set by the master instead of having to set it in a workshop environment before installing it in the plant.

Robert showed the meeting that not only SICK, but many other well-known device manufacturers, incorporated IO-Link capability in their products. In fact it is quite possible that devices that are already installed in our plant have IO-Link capability unknown to their users because of their compatibility with existing signal communication systems.

Robert concluded his presentation with a live demonstration of two IO-Link devices, showing the type of additional data that can come from a basic inductive proximity switch and a colour scanner.

The branch thanks SICK for the kind sponsorship of this evening.
On 4 April, Theo Wassenaar from Emerson Automation Solutions gave an informative presentation on ‘Steam trap monitoring with pervasive sensing and plantweb insight’.

Over the years, steam traps have been seen as mechanical devices that blow off water in steam lines at strategic places. They are typically audited once a year and repaired if failures are detected. As many as 30% of steam traps may be found to be unserviceable when audits are performed, leaving plants vulnerable for potentially long periods of time with a lack of visibility.

Statistically, expected steam trap failure rates range from 12.5-25% per year with 5-10% of total energy lost through leaking steam traps. Cold steam traps (trap valve is stuck closed) can cause water hammers (damage) and blow-through steam traps (trap valve is blocked open) can cause steam losses and excess energy costs.

The Rosemount 708 Wireless Acoustic Transmitter is designed to monitor steam trap behaviour. This continuous monitoring approach leads to effective and successful results.

The branch thanks Theo for this well-received presentation.

Note: All instrumentation and control related mechanics, technicians and engineers are welcome to attend the monthly technology evenings. Planned dates for the rest of the year are as follows:
6 Jun, 11 Jul, 1 Aug, 5 Sep, 3 Oct and 7 Nov. All presentations earn CPD points for ECSA registered persons and any enquiries can be directed to Johan Maritz, +27 82 856 3865.

Annual Golf Day
30 May 2019 | Graceland Casino & Country Club

4-Ball Combo 1: 4-ball + golf prize for each player + prize-giving dinner. R3 700
4-Ball Combo 2: 4-ball + 2x golf cart + golf prize for each player + prize-giving dinner. R4 500
Waterhole sponsorship: Display your posters and equipment providing refreshments for players. R2 500
Coddis and halfway house refreshments on participant’s own account

RSVP 19 April 2019 (4-balls are limited)
Johan Maritz: johan.maritz@kib.mkhize.co.za
082 856 3863

Book now!
The April technology evening featured Alvin Seitz of Bürkert who outlined a fairly new flowmeter technology using surface acoustic waves (SAW). So, are SAW flowmeters the greatest thing since sliced Coriolis?

Yes, and no. Yes they are multivariable devices, which give values for temperature and flow rate. And density sort of: they are capable of detecting changes in density, without giving a definitive value. This will almost certainly be improved as the technology matures. Still on the plus side, they are considerably cheaper than equivalent Coriolis flowmeters, and have a single, unobstructed tube, making them a good fit with the food and beverage or pharmaceutical industries. They also occupy far less pipe length and accuracy is quoted at 0,4% of reading at flow rates above 1 m/s.

No, they are not a direct replacement for Coriolis meters – yet. For one, they need 40 diameters of straight pipe upstream of the device. For another, the range is currently limited to line sizes from DN 15 to DN 50, but this will no doubt change over time. The accuracy of density measurement is something the R&D team is refining, but look out for future improvements.

There was lively interaction with the audience during the presentation and lengthy discussion afterwards. The branch thanks Alvin and Bürkert.

At the last technology evening, Jacques Parrot, a project engineer from SICK Automation, gave an in-depth presentation on “Greenhouse phenomena and the looming legal requirements that emission producing companies may face in the future”.

Continuous, reliable, and real-time measurement of the CO₂ and N₂O load is a must for emission producing companies (vs. the calculation of the source stream). In-situ solutions provide plants with an overview of the amount of greenhouse gases emitted at any time. GHG-Control records the CO₂/ N₂O gas concentration and volume flow, and determines the total quantity precisely.

GHG-Control does not involve the expense of recording the calculation basis, sampling and measurement of substance flows, and intermittent laboratory analyses, especially in the event of changing fuel qualities or fuel carbon content. It offers a direct route to lower costs for organisations that are required to report greenhouse gas emissions.

The branch thanks Jacques and all who attended the presentation. Our success is thanks to your attendance and input. All comments, suggestions and concerns are welcome, please contact Juaandré Heyneke, 082 664 7884.

The April technology evening featured Alvin Seitz of Bürkert who outlined a fairly new flowmeter technology using surface acoustic waves (SAW). So, are SAW flowmeters the greatest thing since sliced Coriolis? Yes, and no. Yes they are multivariable devices, which give values for temperature and flow rate. And density sort of: they are capable of detecting changes in density, without giving a definitive value. This will almost certainly be improved as the technology matures. Still on the plus side, they are considerably cheaper than equivalent Coriolis flowmeters, and have a single, unobstructed tube, making them a good fit with the food and beverage or pharmaceutical industries. They also occupy far less pipe length and accuracy is quoted at 0,4% of reading at flow rates above 1 m/s.

No, they are not a direct replacement for Coriolis meters – yet. For one, they need 40 diameters of straight pipe upstream of the device. For another, the range is currently limited to line sizes from DN 15 to DN 50, but this will no doubt change over time. The accuracy of density measurement is something the R&D team is refining, but look out for future improvements.

There was lively interaction with the audience during the presentation and lengthy discussion afterwards. The branch thanks Alvin and Bürkert.

Juaandré Heyneke (right) presents new member Harry Kelly with the SAIMC certificate.

Juaandré Heyneke (right) thanks Jacques Parrot for the presentation.

Ann de Beer (left) awards Alvin Seitz (right) the SAIMC presentation certificate.

Juaandré Heyneke (right) thanks Jacques Parrot for the presentation.

Juaandré Heyneke (right) presents new member Harry Kelly with the SAIMC certificate.

At the last technology evening, Jacques Parrot, a project engineer from SICK Automation, gave an in-depth presentation on “Greenhouse phenomena and the looming legal requirements that emission producing companies may face in the future”.

Continuous, reliable, and real-time measurement of the CO₂ and N₂O load is a must for emission producing companies (vs. the calculation of the source stream). In-situ solutions provide plants with an overview of the amount of greenhouse gases emitted at any time. GHG-Control records the CO₂/ N₂O gas concentration and volume flow, and determines the total quantity precisely.

GHG-Control does not involve the expense of recording the calculation basis, sampling and measurement of substance flows, and intermittent laboratory analyses, especially in the event of changing fuel qualities or fuel carbon content. It offers a direct route to lower costs for organisations that are required to report greenhouse gas emissions.

The branch thanks Jacques and all who attended the presentation. Our success is thanks to your attendance and input. All comments, suggestions and concerns are welcome, please contact Juaandré Heyneke, 082 664 7884.
Connecting Global Competence

Discover next-level lab technologies

With the acquisition of Lab Africa, Messe München brings the internationally renowned analytica cluster to South Africa.

Visit analytica Lab Africa for:

- Innovations by over 125 exhibitors and over 100 leading brands across a wide range of industries
- Access to refresher courses and demonstrations
- Networking with up to 6,000 stakeholders across related sectors

analytica Lab Africa 2019
International Trade Fair for Laboratory Technology, Analysis, Biotechnology and Diagnostics

July 9-11, 2019 • Johannesburg
Gallagher Convention Centre, Midrand

Register Now At www.analytica-africa.com

Bringing together partners for the Southern African market in the analytics, food & beverage and environmental technology, we are proudly co-located with:

food & drink technology Africa

analytica Lab Africa
A client of Hybrid Automation produces multiple products that are exported throughout the world. The plant is constantly under pressure to meet customer requirements and relies heavily on automation to keep up with orders.

The legacy production line consisted of a manual system, where products were physically taken off the shrink line, and manually packed into boxes. This resulted in inefficient operations due to shift changes and the maximum speed with which products could be packed by hand. Hybrid Automation, with its acknowledged experience in industrial automation and control, was approached by this blue-chip company to upgrade its production line.

**Desired results**

To measure the success or failure of the project, Hybrid Automation was tasked with a list of objectives. Included were speed requirements, measurable by shrinks per minute, safety requirements and operator accessibility. The speed requirements were determined by the previous method of manual packing increased by an appropriate factor. This is a crucial aspect, as there was a minimum target requirement to justify the allocation of funds.

In a production environment speed can be both friend and foe. Although case packing at high speed is good for productivity, it may pose a threat to the operators near the machinery. For the solution to be deemed safe to operate, the client provided several safety guidelines that had to be followed.

The last aspect was that of operator accessibility. The solution had to be simple to operate and minimise the risk of human error. It was also required to work with minimum human intervention.

**Getting the buy-in and other challenges**

A project of this magnitude needs approval by various departments within the client organisation. As discussed earlier, time is a critical factor. Therefore, management had to be persuaded that the solution would pay for itself through an increase in overall productivity. The finance department also had to be convinced that the proposed new production method was more cost-effective than the existing one.

As with any project, there were several challenges. The first was the variety of products that the solution needed to accommodate. This led to the implementation of change parts, which were labelled for easy identification by the operators. Initially parts were 3D printed to aid the operators make guide adjustments for the line. However, this was later solved by the implementation of fixed rulers in conjunction with the explanatory documentation.

The next was mechanical design challenges regarding the box closing device. Initial designs had free moving rollers that were not driven, but this led to the problem where the end of line packed box always needed another behind it to keep the flow going. This was solved by adding driven belts on the side to help boxes through the closing device. This meant that even a single packed box from the line could be handled without a manual purge.

In order to get all relevant parties on board, it had to be proved that the solution was faster and more cost-efficient than manual packing, as well as easy to operate with minimal human intervention. This was done by putting the solution through its paces in a factory acceptance test performed by the client to ensure that all requirements had been met.

**Solution implementation**

In order to determine the most effective solution, the team brainstormed ideas in-house, but with constant critique and input from the end user. After extensive research and deliberation, it was determined that the best solution for this application was Universal Robots’ UR10 cobot. The pick-and-place speed as well as precision of this cobot allowed for all standards and regulations to be met with great effect.

Progress was measured daily by the amount of product being bottled, packaged and packed away into boxes. The results were then analysed and compared to previous figures from before the implementation of the cobot. Consultations and technical support were provided as and when required, and installation and commissioning were completed within one month.

**The benefits**

The primary goal achieved within this project was an increase in packaging volume, which allows a faster production pace and therefore a higher turnover by the end user.

However, the speed and accuracy that comes with this cobot solution requires constants within its environment. In order for continuous precision, the path taken by the product should be tailor-made to ensure consistency. In order to achieve success, consistency is key – from the collating of products to the shape of boxes.

The versatile functionality of the cobot proved an effective way of achieving the desired results, making it a serious contender as a solution in future projects of this nature.

For more information contact

Hybrid Automation, +27 31 573 2795,
info@hybridautomation.co.za,
www.hybridautomation.co.za
**Abacus Automation**

Abacus Automation supplies innovative, custom-developed technical solutions using standard PLCs, drives, scada and motion control equipment and is Siemens approved for crane automation. With 22 years in the industry, this award-winning and internationally acclaimed company has highly qualified, experienced and professional staff. It operates out of offices in KwaZulu-Natal.

Tel: +27 31 702 5767  
sales@abacus-automation.co.za  
www.abacus-automation.co.za

**Afrilek**

As solution providers in the industry, Afrilek’s extensive skills encompass all aspects of electrical, control and instrumentation design; implementation and operation. The company provides complete automation and electrical solutions for projects, panel manufacturing, support and services, training as well as product distribution. With experience in MES, MIS, DCS, PLC/ scada, IoT, networks and security, Afrilek has a solution for you. Afrilek is a proud BBBEE, ISO 9001 and CIDB accredited company.

Tel: +27 11 372 9340  
sales@afrirekl.com  
www.afrirekl.com

**Autotronix**

Autotronix is a recognised leader in industrial automation design and implementation having attained its ISO 9001 certification. Autotronix offers its clients turnkey control system integration services for energy management, PLC/HMI/scada/VSD, manufacture of control panels, applications for water distribution and manufacturing. The company operates from offices in Gauteng and KwaZulu-Natal.

Tel: +27 31 705 0400  
or +27 16 422 7644  
sales@autotronix.co.za  
www.autotronix.co.za

**Control Software Solutions - CSS**

Customer-centricity allows CSS to attain a high percentage of repeat business from its growing customer base. With a solid 16 years’ experience in designing customised C&A solutions, CSS partners with customers in relationships thriving on information sharing and open communication enabling them to enhance customer operations. Supplier Certification provides customers with the assurance that the CSS team is completely up to date on current trends and technology as indicated by a number of prestigious awards.

Tel: +27 31 914 0040  
pieterv@cs-solutions.co.za  
www.cs-solutions.co.za

**Hybrid Automation**

Hybrid Automation is an approved Siemens system integrator and partner for automation and drives, process instrumentation as well as motion control. This enables it to provide its clients with the latest technology and solutions. Its client base includes major blue chip companies and has gained a strong foothold in virtually all the engineering verticals.

Tel: +27 31 573 2795  
info@hybridautomation.co.za  
www.hybridautomation.co.za

**Iritron**

Iritron is a new millennium technology company providing quality solutions in the fields of electrical instrumentation and control systems engineering, systems integration and simulations. It has a proven ability to manage projects efficiently and produce high quality results. It has an extensive track record of successfully implementing plant infrastructure reticulation, designs, and automation and information systems. Iritron, a TUV accredited ISO 9001:2008 technology company, is able to offer its clients PLC, DCS and scada software and hardware, as well as electrical and instrumentation design, engineering, project management and commissioning services.

Tel: +27 12 349 2919  
alwyn.rautenbach@iritron.co.za  
www.iritron.co.za

**Moore Process Controls**

Moore Process Controls provides process automation and optimisation solutions to realise the maximum potential of your plant and assets. Our offerings include DCS, PLC, scada, compressor control solutions, MES, production management and predictive maintenance systems, control loop optimisation, alarm and energy management systems, plant security and access management systems, Matrikon OPC, OSI Soft, dashboards and historians, wireless and data solutions including digital twin, process simulators and training simulators and cloud-based IIoT solutions.

Tel: +27 11 466 1673  
info@moore.co.za  
www.moore.co.za

**PCS Global**

At PCS Global we understand that you’re ultimately in business to maximise profits. This means reduced cost of ownership, increased uptime, consistent results and ultimately a solution that not only fits your budget but lets your business work whilst you’re at home with your family. To us that means providing a hassle free, customised engineering solution that exceeds your expectations. Are you ready to take your business to the next level? We are! Level 2 BBEEE, ISO 9001:2015, CIDB. Siemens, Schneider, Wonderware and Rockwell certified. Automation Innovation, it’s the new AI.

Tel: +27 11 466 4172  
sales@pcsglobal.com  
www.pcsglobal.com
Process Dynamics

Process Dynamics specialises in industrial automation and process control. The company is one of Africa’s leaders in turnkey automation projects and specialises in the integration of scada (WinCC, PCS7, Wonderware, Citect) and PLC (Siemens, Schneider, Rockwell) as well as MCC and control panel manufacturing and installation. Process Dynamics is ISO 9001:2015 accredited as well as a registered CIDB company.

Tel: +27 11 394 5412
systems@process-dynamics.co.za
www.process-dynamics.co.za

PSY International

PSY International specialises in industrial automation and process control. As an approved ABB Authorised Value Provider for softstarters, VSDs and UMCs, it guarantees supply of high quality and technologically advanced products for energy measurement and monitoring. Its core competencies include system integration; control panel building and commissioning; automation design and supply; maintenance and breakdown service; PLC and scada software development and building management systems.

Tel: +27 71 658 1553
paul@psy-intl.com
www.psy-intl.com

Process Dynamics

SAM – Systems Automation and Management

Systems Automation and Management is a supplier of data acquisition systems and innovative automation solutions and is one of the leading integrators of PLC, scada and fieldbus systems in South Africa. The company’s comprehensive range of capabilities includes industrial networks, automation and control, scada, custom solutions, information delivery, data warehousing, hardware and software, BMS, MIS and MES.

Tel: +27 11 803 0570
info@sam.co.za
www.sam.co.za

SEG provides turnkey engineering services, from electrical installations, control and automation through to ICT and advanced AI systems. The company’s SkillUp Training Centre provides its clients with certified ICT courses, best business practices and soft skills training. SEG is also home to the award winning product, HSEC Online, a complete online document management, safety and compliance system.

Tel: 086 099 5105
info@saryx.co.za
www.saryx.com

Saryx Engineering Group

Not just a list . . .

Annual package includes:
- Full company listings as above
- Two A4 pages of in depth case studies or company profiles written by our journalist
- These will appear in print and online at www.instrumentation.co.za
- PDF copy of all articles will be available for your own marketing purposes
- Your SI listing will be published in full in the System Integrator section of the annual SA Instrumentation & Control Buyers’ Guide with a link to your url

To find out how you too can be included, contact:
Jane: +27 31 764 0593 | jane@technews.co.za
Laura: +27 11 543 5806 | laura@technews.co.za
Adroit brings M2M, IoT and IIoT to the industrial world

By Dave Wibberley, managing director, Adroit Technologies.

We have all become familiar with the terms Machine to Machine (M2M), Internet of Things (IoT), Industrial Internet of Things (IIoT) and Industry 4.0. At Adroit Technologies, we have been grappling with the challenge of how we can bring the expected value to customers in a format that takes away some of the quite significant problems we have, while developing and implementing various projects within this space.

Before we start, it is also important to know that people generally change for only two reasons:
- The need to comply with some enforceable regulation – regulatory driven.
- They need to find ways of doing business more efficiently – cost driven.

Definitions – a general understanding is summarised below
The term IoT increasingly shows a pronounced consumer angle, while IIoT and M2M's heritage is in industrial sectors. Through sensors and communication, manufacturers have automated and streamlined their factory floors and their supply chains for decades. These types of technologies should largely be seen as supplementing existing control solutions, where being able to get higher resolution data reliably and cheaply into an existing scada, or into the cloud, can support complex system designs to offer better insight through artificial intelligence (AI) or machine learning.

Industry 4.0, on the other hand, is a term the German government coined in 2011. The term refers to a fourth industrial revolution built on smart factories, which now form part of that country’s high-tech strategy. Industry 4.0 includes many different technologies, from cloud and big data to collaboration solutions.

History and background
Telemetry, or remote data acquisition, has been part of the industrial world for decades. Most distributed control systems, particularly within the utilities space, have used telemetry to monitor remote substations, pump stations, high-sites etc. The front-end communications devices have been radio telemetry units (RTUs) to bring the data back over dedicated radio networks to a central scada system, housed at some control room.

RTUs themselves were never designed to be PLCs, but more a communication device with some I/O that allowed fairly crude and mostly simple control. Where more efficient control was required, a PLC was usually added and the RTU simply used as a gateway, to handle the more complicated aspects of the communication. So, telemetry protocols were developed specifically to handle data within these distributed and, often not so reliable, networked systems.

Telemetry networks and RTUs were specifically designed to do the following:
- Minimise the use of the radio network.
- Time-stamp data at the RTU (and to synchronise time between RTUs).
- Handle exception-based data and broadcasts.
- Handle the 'store and forwarding' requirements so as to ensure the scada always gets the data, even if it is delayed due to unreliable communications.
- Handle the ability to download new firmware or application layer changes to the programs running remotely on the RTU.

It is also worthwhile mentioning that the PLC protocols that we have all become familiar with, were never designed for distributed control systems, but for more physically tightly bound communications, either to operator terminals or HMI/scada systems. The protocols were designed to be fast and largely serial in nature, command response type, where a PC or host device requests certain data from a certain PLC, even within a network. In addition,
none of them supported the concept of time stamping at source (PLC), as this has significant impact on the ‘size’ of packets, and therefore, on performance. This applies to even the most commonly used protocols, such as Modbus, which is probably the most widely implemented on devices other than PLCs.

The game changer
The game changer is the Internet and, in particular, the convergence of the large telecommunication companies (Telcos) and specialised IoT network companies, like Sigfox, bringing about the ability to interact with the Internet using their own networks to form the largest, and probably the most reliable, global network available.

Taking Sigfox as an example, this French-based company started 10 years ago, now has a ‘0G’ network based in 60 countries globally covering over one billion people. Its focus is building a reliable, low-cost network that supports millions of low cost devices, based on small packets of data, with the benefits of LPWAN giving reliable and wide area coverage. In addition, it now boasts over 700 certified devices, which can essentially work anywhere in the world on a Sigfox network. Such access to low cost globally certified sensors makes it an extremely attractive proposition for customers wanting to build a global digital strategy.

Adroit Technologies using the IoT to drive value
At Adroit, we have focused our efforts on finding ways of leveraging the IoT as a way of supplementing existing and new customer control systems. We partner with various local and international sensor manufacturers running on the Sigfox network in the following areas:

- Metering.
- Pressure monitoring.
- Security.
- Asset tracking.
- Machine monitoring.
- Process Monitoring (using 4-20 mA).

A good example is that we, along with specialist flow and pressure instrumentation company, Allpronix, have certified a pressure instrument that will do the processing on the device and can alert users to when a measurement is out of range. In addition, the device transmits the min, max and mean of the pressure taken over a 15 minute sample period. All this installed at less than R9000. This gives utilities and industry the ability to add around four times the resolution of traditional infrastructure. So early detection of leaks and quality of supply can be realistically measured, which can lead to millions in savings for municipalities and industry.

The Adroit 10 scada has a Sigfox driver and this allows customers to take advantage of the IoT on existing infrastructure with benefits realised in days, not years.

In conclusion
Adroit Technologies has paid its school fees in terms of understanding the unique challenges of bringing M2M and the IoT into the industrial arena. The potential for customers and suppliers to differentiate themselves and to generate more value-add business is massive. The company is now in a position to ensure that users can get their company’s digital strategy going in a fraction of the time, and at a fraction of the cost.

As always, we at Adroit Technologies focus on delivering higher value to our users at no extra cost. Combining the new IoT capability with GIS interfaces, situational awareness and alarm management data, all can use the big data and analytical processing capability of our standard scada Intelligence software package to derive greater insights and value from their processes. We are looking forward to customers using and giving us great feedback on the improvements this approach brings to their organisations.

For more information contact Dave Wibberley, Adroit Technologies, +27 11 658 8100, info@adroit.co.za, www.adroit.co.za
The subject projects of this year’s Scada Review are a worthy reflection of the effort put in by the respondent end-users, SIs and vendors. It is encouraging to see that even in these times of economic stagnation and uncertainty there are world-class projects being engineered by South African companies across a range of industrial sectors.

Insight in the detail

We remind readers that the value of the reviews is not always about the capabilities of the scada product – it may be about how the project has been engineered or managed, innovative system architecture or the adoption of certain standards. This year’s reviews contain details of all of these and more.

In print we feature each vendor’s response, which we have edited to meet space constraints. In order to prevent such editing from keeping valuable information from readers, we have published the full-length questionnaire responses online. For readers’ convenience, we have provided a link to the full-length article at the end of each printed review.

Our subject projects

Highlights of Schneider Electric’s submission included an upgrade to an existing Citect system at Sasol Synfuels in Secunda. The main drivers for the upgrade were to overcome obsolescence, establish engineering standards and full compliance with the abnormal situational management (ASM) standard.

The end user was particularly impressed with the comprehensive situational awareness library, better alarm management capability, support structure and upgrade path. Also, operators now have the ability to build their own trends to aid real-time decision making.

Adroit Technologies’ project used IoT-enabled devices to monitor assets and infrastructure for a leading water utility. This Smart City project was implemented in parallel with an existing Adroit SCADA system, which monitors and controls the area’s water systems and services.

This project was undertaken with a view to mitigating risk and to take advantage of new digital technologies to enable better service delivery to consumers. The end user was particularly impressed with the Adroit Smart UI and the GIS interface. Also, Adroit Performance Anywhere gives users access to the data in the agent server via an easily configurable interface utilising predefined objects. This can then be viewed in any web-enabled device’s browser window.

Thank you

On behalf of our readers, we thank the end-users, SIs and vendors for their efforts in comprehensively completing our 2018 scada questionnaire, for sharing their expertise and experience, and continuing to expand the knowledge base of the C&I industry in South Africa.

Notes:

1. The order of appearance of reviews is the order in which they were received by SA Instrumentation and Control.
2. Some reviewer responses have been edited due to space and comprehension considerations.
3. A ‘No’ or ‘N/A’ response to a question in the project-specific responses does not necessarily mean that the scada system lacks that feature; only that the feature was not implemented in, or not applicable to, the subject project.
4. Where a respondent has not answered a question, or has answered off topic, that response has been omitted.
Your smart SCADA solution for line management and lite supervision

Magelis GTU Open Box/iPC and EcoStruxure Machine SCADA Expert bundle

Enjoy the benefits and advantages of a SCADA system without paying for functionalities you don't need. Applications range from complex machine control and monitoring to plant supervision and SCADA, our Magelis GTU Open Box/iPC and EcoStruxure Machine SCADA Expert bundle makes your operations smooth and stress-free with its intuitive, multitouch experience, saving you time, resources, and money.

Connectivity and data management

- Realize the power of the IoT with EcoStruxure Machine SCADA Expert’s extensive IT and OT driver library and data management capabilities (connection between ERP, MES, third-party historians, and the plant floor)
- Includes 250+ native communication drivers
- Native OPC interface, including OPC UA, OPC DA, OPC XML, and OPC .NET
- With EcoStruxure Machine SCADA Expert Mobile Access, you can use your tablet or smartphone to remotely connect

www.se.com/za
### End-user details

<table>
<thead>
<tr>
<th>Name</th>
<th>Nuuan van der Neut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation</td>
<td>Instrumentation and Control Engineer</td>
</tr>
<tr>
<td>Company</td>
<td>Sasol Synfuels</td>
</tr>
<tr>
<td>Phone</td>
<td>+27 17 610 9349</td>
</tr>
<tr>
<td>E-mail</td>
<td><a href="mailto:nuuan.vanderneut@sasol.com">nuuan.vanderneut@sasol.com</a></td>
</tr>
</tbody>
</table>

### SI details

<table>
<thead>
<tr>
<th>Name</th>
<th>Johan Potgieter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designation</td>
<td>Senior Service Engineer</td>
</tr>
<tr>
<td>Company</td>
<td>Schneider Electric</td>
</tr>
<tr>
<td>Phone</td>
<td>+27 11 046 2021</td>
</tr>
<tr>
<td>E-mail</td>
<td><a href="mailto:johan.potgieter@se.com">johan.potgieter@se.com</a></td>
</tr>
</tbody>
</table>

### Product details

<table>
<thead>
<tr>
<th>Product name and version</th>
<th>Citnet SCADA V2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor</td>
<td>AVEVA, Schneider Electric</td>
</tr>
<tr>
<td>Phone</td>
<td>086 130 0222</td>
</tr>
<tr>
<td>E-mail</td>
<td><a href="mailto:za-ccc@schneider-electric.com">za-ccc@schneider-electric.com</a></td>
</tr>
</tbody>
</table>

### Application details

<table>
<thead>
<tr>
<th>Location</th>
<th>Secunda, Mpumalanga, South Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>Oil &amp; gas</td>
</tr>
<tr>
<td>Project start date</td>
<td>2018-03</td>
</tr>
<tr>
<td>Project end date</td>
<td>2019-01</td>
</tr>
<tr>
<td>Application</td>
<td>Monitor and control water recovery area</td>
</tr>
<tr>
<td>Server OS</td>
<td>Windows Server 2012R2, Windows 2016</td>
</tr>
<tr>
<td>Client OS</td>
<td>Windows 10</td>
</tr>
</tbody>
</table>

### Application statistics

<table>
<thead>
<tr>
<th>Tag count</th>
<th>Digital Tags = 4289</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Integers = 4289</td>
</tr>
<tr>
<td></td>
<td>Real = 972</td>
</tr>
<tr>
<td></td>
<td>Urgent Alarms went from 1123 to 28</td>
</tr>
<tr>
<td></td>
<td>High Alarms = 260</td>
</tr>
<tr>
<td></td>
<td>Low Alarms = 361</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Updates per day</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disk space for one day’s updates</td>
<td>800 MB</td>
</tr>
</tbody>
</table>

**END-USER RESPONSES**

**General**

Q: Briefly describe the application including information on any pre-existing control system.

The client has been using Citnet SCADA V6.1 with Windows XP and Windows server 2003 which has been out of support. V6.1 and operating systems was in a mature lifecycle phase which indicate its functionality is stable and obsolete. The main drive for the upgrade to V2018 was to overcome obsolescence, establish engineering standards and migrate the system to be fully compliant to the ASM (Abnormal Situational Management) Standard.

Q: What were the primary motivations for the project?

- Outdated scada, obsolete operating systems, lack of knowledge, skills and diagnostic tools.
- Alarm flooding: poor alarm management.
- Change management: backups, deployment and version control.
- Security: upgraded from application level only.
- Colours: no consistency in colour management.
- ASM: non ASM complaint.

Q: In the procurement decision making process what were the primary considerations that influenced the product selection?

Current installed base is Citnet SCADA, support from vendor and initial costs.

Q: What project management principles and/or methodologies did you employ as end-user to mitigate risk, ensuring the project came out on time and within budget?

Methodology: Agile.

1. Customer satisfaction through early and continuous software delivery.
2. Accommodate changing requirements throughout the development process.
3. Collaboration between the business stakeholders and developers throughout the project.
4. Support, trust and team motivation
5. Working software is the measure of progress.
6. Agile processes to support a consistent development pace.
7. Attention to technical detail and design.
8. Self-organising teams.
9. Regular reviews on project effectiveness.

**Licensing, maintenance and support**

**Q: What upgrade agreements are in place on this particular application?**

With a comprehensive suite of service levels and options, the client can choose the program level that best suits their specific needs. Whether they are planning a new installation, optimising and fine tuning a mature system, preparing a major upgrade, or evolving their system with the latest software upgrades to take advantage of rich new capabilities. The customer is on annual premium subscription, which gives them access to the latest software and 24/7 support. Any enhancements or upgrades will be on a case by case basis.

**Q: How is after-sales support handled on this application?**

This is provided via regular site visits and telephonic remote support.

**Q: Do you have a documented process in place to manage, test and install OS and scada system software patches?**

We have a standard procedure based on hierarchies of workstations and criticality of patches that determines the order and speed with which we deploy patches. Schneider Electric tests its products on systems that are configured with all the cumulative Microsoft Updates. Any exceptions to this will be listed in the Schneider Electric report specific to the test.

**Integration, reporting and archiving**

Q: Is the scada system integrated onto an intranet or the Internet?

No.

Q: Is the system integrated with an MES/ERP or other management reporting or control system?

Will be implemented on a later stage.

Q: Do you run the scada in conjunction with any third-party application software?

No.

Q: Does the application include data archiving/historian capabilities with an historical data reporting system?

Will be implemented on a later stage.

**Maintenance, reliability and asset optimisation**

Q: Have any operational or production benchmarking tools been configured as part of the scada system?

No.

**End-user conclusion**

Q: What was the predominant feature (or features) that made you decide to purchase this scada product over all others for this application?

Comprehensive situational awareness library, better alarm management, compatibility, adaptability, lower risk, support structure and upgrade path.
Q: What was the most significant change you implemented in scada engineering practice / technology in this project?
- Engineering efficiency: Deployment Server makes it easier to roll out changes and manage version control.
- Operator awareness: fully ASM compliant.
- Cross platform transparency.
- Security improvement: domain level security.
- Process Analyst: operators have the capability to build their own trends.

Q: What single operational feature most impresses you about the product now that it is in operation?
ASM Aspect: operator response time and the identification of abnormal situations is quicker.

Q: What impresses you most about the architecture?
- Every area is set up as a different project.
- Multiple engineers can do development within the architecture layout.

SI RESPONSES
Project details
Q: What tools were used to minimise the man-hours taken?
Build in Equipment generator and Excel.

Q: What human factors were taken into consideration as principles or development standards in the HMI design process?
Colour usage, amount of screens, abnormal situational awareness and ergonomics.

Q: For the graphics development process did you use standard library images, or did you have to draw images from scratch?
Both.

Q: How would you describe the library of graphic images?
Comprehensive.

Q: What alarm management standards or best practices were adopted in configuring the scada system alarms?
ISA18.2

Q: What structured processes were followed to determine expected performance under full load, and during abnormal failure conditions?
A complete library of test sheets with a pre-determined set of acceptable limits exists within the Schneider Electric Quality Management System. During commissioning, failures are simulated and results documented against these pre-determined criteria. Exceptions are documented as non-conformances and are actioned before final handover.

Q: What are the key physical communication layers and communication protocols employed in the system?
New Ethernet installation.

Q: What is the network speed and communications medium of the slowest link in this project’s scada network?
100 MB over Ethernet.

Q: What is the network speed and communications medium of the fastest link in this project’s scada network?
1 GB over Ethernet.

Q: What levels of redundancy are incorporated in this scada application?
Citect SCADA hot standby servers.

Maintenance, reliability and asset optimisation
Q: What steps were taken to address maintenance, reliability, asset optimisation and/or continuous improvement aspects relating to this system?
Citect SCADA hot standby servers.

Project management
Q: What project management principles and/or methodologies did you as SI employ to mitigate risk and to ensure the
project came out on time and budget? Schneider Electric’s Customer Project Process (CPP) was employed. This is an internally branded Project Lifecycle Management system. CPP methodologies provide guidance for the implementation of a customer project and strive to provide a superior customer experience.

Security and data protection
Q: How have authentication, authorisation and role management been configured?
Authentication has been implemented using a Windows Active Directory domain (users and groups). Each domain group has been associated with internal Citect groups. Within the Citect environment role-based security is implemented, where roles are associated with specific areas. A scada user is unable to view information outside his area without explicit permission.

Q: Does the design make provision for a DMZ and firewall segregation of process (scada) network and business networks (LAN, WAN, GAN, Internet, etc.)?
The solution is logically separated using VLANs. Further information is unavailable as the network is managed by the end-user.

Q: What intrusion detection has been incorporated on the plant network(s) on which this scada system exists?
Intrusion detection is provided via McAfee.

Q: In what ways is this project’s hardware architecture optimised for: patch management and antivirus management?
1. Patch management is done by Schneider Electric. Every second week of the month a new patch is released. The patch is tested. If performance or functionality improvements are evident, a date and time are arranged for implementation.
2. Antivirus management is managed through site IT personnel.

To implement any patches or antivirus changes, the rollout is first done on all A-machines. A-machines consist of the primary server and 1 operator station in each control room. The rest of the plant runs from B-machines: the hot standby server and the 2nd operator station in control rooms. When test and rollouts are done, they are duplicated on the B-machines.

Q: What configuration backup and data archive backup methodologies have been adopted?
Configuration and data backups are performed weekly, monthly and on change.

Table 1.

<table>
<thead>
<tr>
<th>Product version / Module versions</th>
<th>Current version</th>
<th>Subject project – used</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Citect SCADA 2018</td>
<td>Citect SCADA 2018</td>
</tr>
</tbody>
</table>

Table 2.

<table>
<thead>
<tr>
<th>Operating systems – client side run-time?</th>
<th>Product response – supported</th>
<th>Subject project – used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 10</td>
<td>Windows 10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating systems – client side configuration?</th>
<th>Windows 10</th>
<th>Windows 10</th>
</tr>
</thead>
</table>

| Browser based? | The Citect SCADA Web Client allows users to view a live project within a web browser. A new feature that can be bought separately for mobile devices is Citect Anywhere, which uses HTML 5 architecture. | N/A |

| Front end device communications protocols | OFSOPC, PSDIRECT, MELSEC, MODNET, ABCLX | TITCPIP |

| Does the scada system rely on Java plug-ins to exploit the full functionality of its core and additional modules? | No | No |

Table 3.

<table>
<thead>
<tr>
<th>Product uses Web Services?</th>
<th>No</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud computing supported?</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Virtualisation models supported?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Multi-touch gestures supported by OS + scada hardware + scada software?</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

SI conclusion
Q: How would you rate the ease of use of the historical reporting system?
Easy.

Q: What impresses you most about the engineering/configuration aspects of the product now that it is in operation?
The ease of implementing changes. Navigation is also much quicker for site personnel on the scada information given from the new improved Alarm Server.

Q: What impresses you most about the architecture?
The small hardware server footprint for the scada application, where a single server is used for alarming, logging, trending, and scanning to PLCs, thus reducing overall costs.

VENDOR RESPONSES
Product (Table 1.)

Q: Vendor comments on product/ modules?
Schneider Electric is committed to at least one release per annum; within a given 12 month period we continue to enhance product quality with service packs and add-on packages such as +PowerConnect and +Facilities. The Citect SCADA product is core to Schneider Electric’s automation architecture and is continually enhanced to support integration of Schneider Electric products.

Operating systems/VMware (Table 2.)

Licensing, maintenance and support model
Q: What sort of licensing agreement options are offered?
There are 3 types of licences: Full Server, client read-only and client read-write. There is no differentiation between modules, and a single full licence enables all functionality. A full licence also acts as a client on the server hardware and the system can be operated from this server. Additional clients provide users access to all system features from additional hardware connected to the system via an Ethernet network. A base licence comprises core modules, with optional modules available.

Q: Are licences sold outright or subject to periodic (e.g. annual) renewal?
Licences are a once-off purchase with a yearly renewal named Customer First. Customer First for Citect SCADA offers a rich portfolio of fundamental services to help protect and extend the value of the software investment. A Customer First agreement protects the entire investment by delivering via:
- Software version updates and upgrades.
• Streamlined access to support experts.
• Access to the Global Customer Support website, a source for extensive self-assist tools to help configure or troubleshoot a system.
• Optional services to help optimise and extract value from the software solution.

Q: What upgrade agreements are offered?
Patches and hot-fixes are available to end-users with valid maintenance agreements. Version upgrades are available to those end-users with valid maintenance agreements.

Q: What after-sales offerings iro support and maintenance are available, and which technologies are used to deliver them?
Support is covered under a paid annual support agreement and includes ‘virtual engineer’ (desktop remoting), telephonic support, e-mail support, online self-help tools, automatic driver updates, product upgrades, on-site engineering under a service level agreement, security advisory services, user forum (LinkedIn group) and online knowledge base repository.

Q: Do you have a documented process in place to manage and test OS patches and to release scada system software patches?
Citect’s goal is to verify that Microsoft Security Updates work with Schneider Electric Software within 15 business days of release. Any exceptions to this will be listed on the Safety & Security Central web page.
Microsoft Security Bulletin Master Page (includes related KB Articles). Microsoft KB articles for a particular patch are listed in each Microsoft Security Bulletin:
• Microsoft Security Bulletins master page.
• Microsoft Security Bulletin Data

Technology incorporated (Table 3.)

Q: What changes have been introduced into the product in the last 12 months?
The upcoming release delivers on three strategic pillars as below, each of which will be explored in further detail throughout a number of focused blog posts over the coming weeks and months:
• Significantly increasing engineering efficiency and speed to production.
• Reducing operator distractions to deliver increased operator awareness.
• Increasing operational productivity and real-time decision making.

How does Citect SCADA 2018 achieve this?
With a focus on providing richer context in addressing Abnormal Situational Management (ASM) across a variety of industrial applications, Citect SCADA 2018 includes a number of enhancements that empower operators to optimise the engineering experience with:
• A dedicated situational awareness workspace.
• An extensive library of configurable objects, including out-of-the-box faceplates.
• A wealth of alarm management capabilities.
• Visualisation and graphics enhancements.

A preview of comments from Citect SCADA 2018 beta customers can be found at: https://www.techvalidate.com/product-research/schneider-electric-software-citect-scada/facts.

Table 4.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Process Analyst Tool</td>
<td>Productivity is increased via analysis of processes used to improve plant and production efficiencies.</td>
</tr>
<tr>
<td>Scalability</td>
<td>Allows the system architecture to grow with project requirements, while preserving initial project investment.</td>
</tr>
<tr>
<td>Reliability</td>
<td>Citect’s redundancy will tolerate failure anywhere in the system, with no loss of functionality or performance.</td>
</tr>
<tr>
<td>Open architecture</td>
<td>A collection of over 150 protocol drivers and Citect’s open connectivity from various information systems allows seamless data flow.</td>
</tr>
<tr>
<td>Automation tools’ integration</td>
<td>The integration of Schneider Electric tools such as the Pelco ActiveX, Webgate ActiveX, Magelis Diag Buffer and Speedlink reduces engineering time and ensures all components are able to communicate seamlessly.</td>
</tr>
</tbody>
</table>

Q: What capabilities does the scada offer in terms of generation and/or management of PLC configuration files or PLC application code?
Citect enables the synchronisation and automatic creation of variable tags using a Unity application project file (.STU), CSV file or OPC Server. It does not generate PLC configuration or PLC application files. It maintains a common set of variables between Citect and Unity, i.e. when tags are added to a Unity Linked device from Citect, the Unity STU file is updated and when variables are added from the Unity environment and saved to the STU, Citect will import the updated variable list.

Q: What native historical data reporting options are available?
Citect Trend Server is a standard archiving component within Citect SCADA that will enable an end user to access historical data through a native client tool called Process Analyst. Aveva Process Historian is a high-performance process historian, capable of storing huge volumes of data generated from today’s industrial facilities. Historian easily retrieves and securely delivers information to desktop or mobile devices, enabling organisations to analyse processes anywhere at any time.

Q: List the top five feature/benefit pairs that contribute to this product’s USP.

Unique selling proposition (USP) (Table 4.)

PLC configuration and programming
Q: What capabilities does the scada offer in terms of generation and/or management of PLC configuration files or PLC application code?
Citect enables the synchronisation and automatic creation of variable tags using a Unity application project file (.STU), CSV file or OPC Server. It does not generate PLC configuration or PLC application files. It maintains a common set of variables between Citect and Unity, i.e. when tags are added to a Unity Linked device from Citect, the Unity STU file is updated and when variables are added from the Unity environment and saved to the STU, Citect will import the updated variable list.

Security and data protection
Q: What authentication, authorisation and role management models are available for the runtime environment?
The following should be considered: areas, privileges, roles and users. Security may be incorporated in the application or through Windows’ integrated authentication, which will determine where users are created:
• Areas: an area is a section of the plant. It can be defined geographically or logically.
• Privileges: level of access applied to system elements within the project. A user is assigned a role that possesses particular privileges.
• Roles: a defined set of permissions (privileges and areas) that are assigned to users.
• Users: a person or group that need access to the runtime system.

Table 4.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated Process Analyst Tool</td>
<td>Productivity is increased via analysis of processes used to improve plant and production efficiencies.</td>
</tr>
<tr>
<td>Scalability</td>
<td>Allows the system architecture to grow with project requirements, while preserving initial project investment.</td>
</tr>
<tr>
<td>Reliability</td>
<td>Citect’s redundancy will tolerate failure anywhere in the system, with no loss of functionality or performance.</td>
</tr>
<tr>
<td>Open architecture</td>
<td>A collection of over 150 protocol drivers and Citect’s open connectivity from various information systems allows seamless data flow.</td>
</tr>
<tr>
<td>Automation tools’ integration</td>
<td>The integration of Schneider Electric tools such as the Pelco ActiveX, Webgate ActiveX, Magelis Diag Buffer and Speedlink reduces engineering time and ensures all components are able to communicate seamlessly.</td>
</tr>
</tbody>
</table>
### Adroit Technologies

To view the unabridged version of this scada review, please visit [http://instrumentation.co.za/papers/J4479.pdf](http://instrumentation.co.za/papers/J4479.pdf)

### End-user details

<table>
<thead>
<tr>
<th>Water utility</th>
</tr>
</thead>
</table>
| **Name:** Dean Gibson  
**Designation:** Project Engineer  
**Company:** Adroit Technologies  
**Phone:** +27 11 658 8110  
**E-mail:** deang@adroit.co.za |

### SI details

|  
**Product details**  
**Product name and version:** Adroit Smart UI 10.0.4.0  
**Vendor:** Adroit Technologies  
**Phone:** +27 11 658 8110  
**E-mail:** support@adroit.co.za  
**URL:** https://adroittech.co.za |

|  
**Location:** Gauteng, South Africa  
**Industry:** Municipality water services  
**Project start date:** November 2018  
**Project end date:** April 2019  
**Application:** Remote monitoring of assets and infrastructure  
**Server OS:** Windows server 2012 R2  
**Client OS:** Windows server 2012 R2 |

### Application details

|  
**Tag count:** 100 Agents - 9 Accumulator, 26 Digital, 26 Frame, 26 Expression, 4 Debug, 8 Device, However the system is expected to grow as new devices are added to the project.  
**Updates per day:** 728 tags are recorded SQL, all digital values are logged on change and analog values are logged every 5 minutes  
**Disk space for one day’s updates:** This is dependent on the activity of the systems, however a Terabyte hard drive is expected to last the lifetime of the solution |

|  
**Physical I/O count:** Currently the project has 8 IoT agents each communicating to 8 IoT enabled devices via Sigfox driver. However, this is expected to increase as new devices are added to the solution  
**Front ends:** 23 Sigfox devices of various types e.g. tamper, flow, pressure, GPS and vibration  
**Licences:** Adroit Smart UI  
**Scada configuration man-hours:** 160 hours |

### Application statistics

| **Tag count:** 100 Agents - 9 Accumulator, 26 Digital, 26 Frame, 26 Expression, 4 Debug, 8 Device, However the system is expected to grow as new devices are added to the project.  
**Updates per day:** 728 tags are recorded SQL, all digital values are logged on change and analog values are logged every 5 minutes  
**Disk space for one day’s updates:** This is dependent on the activity of the systems, however a Terabyte hard drive is expected to last the lifetime of the solution |

### END–USER RESPONSES

#### General

**Q:** Briefly describe the application including information on any pre-existing control system.

This end user is implementing the Smart City project using IoT enabled devices to remotely monitor its fixed and moveable assets as well as infrastructure. The Smart City project was implemented in parallel with an existing Adroit SCADA system, which monitors and controls the end user’s water systems and services.

**Q:** What was the primary motivation for the project?

This project was started with a view to mitigate risk and to take advantage of the new digital trend for better service delivery to its customers.

**Q:** What were the main goals established for the project?

Demonstrate reliability and endurance in live environments of IoT enabled devices. A number of pre-defined devices were chosen to achieve the following goals:

- Detection of manhole tampering.
- Notification of access to underground infrastructure.
- Water metering.
- Pipeline pressure monitoring.
- Asset tracking and notification with geo-fencing.

Data collected by the IoT sensors is applied in ways that benefit and add value to the current scada system.

**Q:** In the procurement decision-making process what were the primary considerations that influenced the product selection?

Adroit Technologies existensively tested and developed its IoT platform using Visio sensors and theSqwidnet backend. Although Adroit Technologies is not reliant on one particular vendor or IoT product, both these companies provided excellent services and products.

**Q:** What Project Management principles were employed to mitigate risk, ensuring the project came out on time and within budget?

The project scope was developed using the Project User Requirements Document and Functional Design & Specifications Documentation. Scada engineering was covered by Adroit Technologies and installation of the sensors was outsourced.

### Licensing, maintenance and support

**Q:** What licences have been purchased for this particular application?

Adroit Smart UI.

**Q:** What upgrade agreements are in place on this particular application?

Adroit Groupwide Agreement.

**Q:** How is after-sales support handled on this application?

As part of an SLA agreement a 24 hour support resource is available as well as remote access for trouble shooting and diagnostics. As reliability is a core requirement for the Smart City project, a weekly inspection is scheduled, and an offsite backup is kept as part of the SLA.

**Q:** Do you have a documented process in place to manage, test and install OS and scada system software patches?

A complete CRM system has been implemented to augment the support of Adroit Smart UI.

Microsoft Team Foundation has also been implemented as part of the quality assurance. Once the project team has a complete understanding of the end users requirements a functional design specification (FDS) was created for the implementation of the solution.

This FDS document includes (but is not limited to):

- Project standards.
- Product upgrades.
- Long term viability.

### Integration, reporting and archiving

**Q:** Is the scada system integrated onto an intranet or the Internet?

One of the Smart City project requirements was easy access to information. To facilitate this Adroit implemented a ‘traditional’ scada interface as well as a geographic information system (GIS) interface and Adroit Performance Anywhere, which accesses the scada’s data via HTML5 web services. In addition, the Adroit Secure Mobile Gateway solution has been implemented to allow secure access to the scada from outside the company IT infrastructure.

**Q:** Does the system include or interface with an expert system?

N/A.

**Q:** Is the system integrated with an MES / ERP or other management reporting or control system?

N/A.

**Q:** Has any GIS (Geographic Information Systems) functionality been configured in the application?

The Adroit Smart UI has a GIS interface, which allows added intelligence to map overviews by...
System architecture.

dynamically or statically defining map nodes and geo-areas. In the case of the Smart City project, each node was assigned to an IoT device. The GIS interface also allows the nodes/IoT devices status and alarm conditions to be displayed at a global level. The GIS control also facilitates navigation to a user defined faceplate.

Q: Has any asset management functionality been configured in the application?
As part of the assets tracking requirement for the Smart City project, a number of mobile generators were fitted with GPS IoT devices. This allowed the scada to display the current position of the assets on the GIS interface and also allowed alarm notification when an asset left its geo-fenced area. These alarm notifications have also been linked to configurable timers so if an asset stays outside its area for a user defined time, another alarm notification can be generated. In addition, the IoT will assist to enforce quality control as reservoir lids must be opened to get verification from the IoT device, which helps to ensure that samples are taken.

Q: Does the application include data archiving/historian capabilities with an historical data reporting system?
Currently, the system has only been configured for minimal reporting using Adroit native SQL logging functionality. Future integration with Adroit SCADA intelligentsia has been planned, which will allow for a richer reporting environment.

Maintenance, reliability and asset optimisation
Q: Have any operational or production benchmarking tools been configured as part of the scada system?
N/A.

Q: What maintenance, reliability, asset optimisation or continuous improvement criteria were included in the user requirements specification for this project?
The Smart City project requires that the following functionality be included so as to ensure the reliability of the data being collected
• Device commutation failure (Last report received > 6 hours).
• Site maintenance mode – suppress alarms and exclude data from audit reports.
• Network quality.
• Sensor failure or out of service alarms.
   Additionally the Adroit Alarm Management report suite has also been implemented to measure predefined system KPIs.

Mobile device support
Q: Are you currently using tablets, mobile phones or other smart mobile devices to interact with the scada system? If so, for what purposes?
The system allows users to retrieve a limited dataset via their smart devices, depending on authentication and user rights.

Q: Do you allow users to interface with the scada system via their own personal smart devices? (BYOD)
Adroit Performance Anywhere utilises HTML 5 web services, which gives a user access to the data in the agent server via an easily configurable interface utilising predefined objects called widgets. This can be viewed in any web enabled device’s browser. Alternatively, web development is available via the HTML 5’s web service Software Development Kit (SDK).

End-user conclusion
Q: What was the predominant feature (or features) that made you decide to purchase this scada product over all others for this application?
The Adroit Smart UI is a rich open platform, which allows engineers to fulfil client expectations and requirements.
Q: What was the most significant change that you implemented in scada engineering practice/technology in this project?
The object and template models available were extensively used in order to shorten engineering time.

Q: What single operational feature most impresses you about the product now that it is in operation? The GIS interface.

Q: What impresses you most about the architecture? Open platform; wide range of drivers supplied standard with the product; the ability to upgrade; easy to implement and to integrate.

SI RESPONSES

Project details
Q: Approximately how many man-hours did the scada configuration take? 160 hours.

Q: What tools were used to minimise the man-hours taken? All engineering was done from first principles.

Q: What human factors were taken into consideration as principles or development standards in the HMI design process? ISA 101, Human Machine Interface Design.

Q: For the graphics development process did you use standard library images, or did you have to draw images from scratch? Standard library images were used where applicable.

Q: How would you describe the library of graphic images? Satisfactory.

Q: Did you use any ‘special’ images? No.

Q: What alarm management standards or best practices were adopted in configuring the scada system alarms? The Adroit Report Suite draw on the ISA18.2 Standard, EEMUA 191 Guidelines. What structured processes were followed to determine expected performance under full load, and during abnormal failure conditions? This is a core function/requirement of the Smart City project, and has been built into the solution. This means that network reliability and server uptime are monitored as part of the project.

Q: What are the key physical communication layers and communication protocols employed in the system? Sigfox backend with the Adroit Sigfox protocol.

Q: What is the network speed and communications medium of the slowest link in this project’s scada network? The Sigfox devices dictate the speed at which they communicate (exception based). However, each device has a cap of 140 messages per day.

Q: What is the network speed and communications medium of the fastest link in this project’s scada network? 600 bits per second.

Q: What levels of redundancy are incorporated in this scada application? Full redundancy at server level, which includes the Adroit Agent server hot standby and the Smart UI server clustering.

Q: Was any specific custom code or scada scripting written for this project? No.

Maintenance, reliability and asset optimisation
Q: What project management principles were employed to mitigate risk and ensure the project came in on time and within budget? The Agile methodology was used which allowed close integration with the Adroit development team.

Security and data protection
Q: How have authentication, authorisation and role management been configured? A multi-tiered security model was implemented using an existing Microsoft
Q: Does the design make provision for a DMZ and firewall segregation of process (scada) network and business networks (LAN, WAN, GAN, Internet, etc.)? Each step of the communication requires access from one network to another. This was achieved by working closely with the contracted IT consultants to ensure seamless integration.

Q: What intrusion detection has been incorporated on the plant network(s) on which this scada system exists? Fully managed IT infrastructure configured and maintained by the IT consultants.

Q: Is the security model employed based on a standard? An existing end user’s security model was used.

Q: What configuration backup and data archive backup methodologies have been adopted? An automated monthly backup is taken. An offsite backup is kept after any engineering or housekeeping is done.

SI conclusion
Q: How would you rate the ease of use of the historical reporting system? Satisfactory.

Q: What impresses you most about the architecture? The flexibility and openness of the architecture allow engineers to implement the latest software and hardware technologies.

VENDOR RESPONSES
Product (Table 1.)

Q: Vendor comments on product/modules?
Adroit 8.4.3 offers performance enhancements and Windows 10 compatibility.

Operating systems/VMware (Table 2.)

Licensing, maintenance and support model
Q: What sort of licensing agreement options are offered? Base licence comprises core modules and the following optional modules are available: • Performance Anywhere. • Alarm Management agent. • SNMP agent. • Max Demand agent. • OEE Agent.

Table 4.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Simplified bulk configuration</td>
<td>Saves you time and money on scada system configuration.</td>
</tr>
<tr>
<td>2. Web enabled interface</td>
<td>View and control the scada system virtually from anywhere.</td>
</tr>
<tr>
<td>3. Advanced data logging</td>
<td>High-resolution data logging to historian database and custom reporting on data.</td>
</tr>
<tr>
<td>4. Enhanced project security</td>
<td>Prevent unauthorised editing or viewing.</td>
</tr>
<tr>
<td>5. One-click wizard updates</td>
<td>Apply changes to a single template and it affects all other instances throughout the project.</td>
</tr>
</tbody>
</table>

Q: Are licences sold outright or subject to periodic (e.g. annual) renewal? Licence is a one-off purchase or as part of a group wide agreement.

Q: What upgrade agreements are offered? Patches and updates are available free from https://adroittech.co.za/. An upgrade is available as part of the system integrator agreement or a group wide agreement.

Q: What after-sales offerings iro support and maintenance are available, and which technologies are used to deliver them? Adroit offers both on-site and off-site support, either directly through Adroit Technical Services or via an Adroit system integrator in the area.

Q: Do you have a documented process in place to manage and test OS patches and to release scada system software patches? A complete CRM system has been implemented to augment the support of Adroit Smart UI. Microsoft Team foundation has also been implemented as part of the quality assurance for Adroit Smart UI.

Technology incorporated (Table 3.)

Q: What new technology has been introduced into the product in the last 12 months? A comprehensive list of all new features can be found in the ‘What is new in the Adroit 10 Release’ pdf file found on the Adroit 10 DVD. The soon to be released Adroit Air mobile app was deployed as an enhancement on this project. This delivers alarms and messages to users on a mobile app.

Integration and reporting
Q: What generic and/or product specific interfaces does the product have iro well-known MES packages?

Agent server: • ActiveX.COM. • Agent Development Kit (ADK). • Driver Development Kit (DDK).
Smart UI server: • .NET Framework. • Asp.net. • HTML5 webservice (Performance Anywhere).

Q: What native historical data reporting options are available? MS Reporting Services on top of an MS SQL historian.

Maintenance, reliability and asset optimisation
Q: What maintenance, reliability, asset optimisation and/or continuous improvement related modules or capabilities does the product incorporate? The Health Monitor Service is installed with all Adroit Technologies applications and it runs in the background. Its function is to monitor various significant values of the system (computer) on which the Adroit applications are running, since these both directly and indirectly affect their performance (health), such as the CPU load.

PLC configuration and programming
Q: What capabilities does the scada offer in terms of generation and/or management of PLC configuration files or PLC application code? N/A

Security and data protection
Q: What authentication, authorisation and role management models are available for the runtime environment? Full integration with Microsoft Workgroup or Domain Controller, which is paired with the Smart UI profiles configuration to allow the operating environment to be set up on a per user or group basis.

Q: List the top five feature/benefit pairs that contribute to this product’s USP.
Unique selling proposition (USP)(Table 4.)
Endress+Hauser aims to improve the processes of its customers with regards to efficiency, quality, safety and sustainability. When it comes to the mining business, the company is intent on mastering the challenges of extracting and processing precious metals and minerals by increasing efficiency, improving safety and protecting the environment.

Integration as the first step
The question is: how much can Big Data help mining companies master these challenges?

Data is already produced in abundance within a mining operation: process information from the field, inventory values, plant status and market prices to name just a few. The challenge is that most of this data is stored and visible only in different systems. So the first step towards the IIoT has to be the integration of this data to open up its real potential. Integration has to be aligned along three axes: horizontally along the value creation chain, vertically from the field to the control level, and thirdly, from planning to maintenance to ensure consistent engineering. With the help of Endress+Hauser, users can boldly take the first step today.

With respect to the horizontal axis: an exact forecast of consumption based on current inventory values and planned material movements is the key to reducing warehouse stocks and improving delivery services. Reliable measurement is the basis for this and Endress+Hauser can provide a complete range of technology. For data communication, most available fieldbus technologies can be plugged directly into smart measurement sensors. In addition, the local data transmission unit, Fieldgate, with integrated web server, allows for global data acquisition via private and public communication network.

A standard Internet browser is sufficient for querying inventory data. Fieldgate not only provides current measured values, but also offers the possibility of monitoring device stations, requesting information and sending data directly to a superordinate inventory management software system such as SupplyCare from Endress+Hauser.
SupplyCare offers convenient access to the current fill levels in tanks and silos from the comfort of the office, and offers extensive functions for inventory management. With the integrated email function, users can request supplies quickly and easily. With the analysis module, they can also calculate and evaluate KPIs.

Full control of basic processes
When it comes to vertical integration, intelligent networking between subsystems of the mining process, from the ERP system to the operating and control level, and on to the field level, is essential for optimised functionality and the highest efficiency. The reality today is often something less than a smooth, streamlined operation. It is characterised by closed system silos, missing interfaces and many manual data transfers, all of which are potential error sources. However, thanks to Endress+Hauser’s business process integration (BPI) concept, it is now possible to connect these currently decoupled system silos to form an elegant overall system with a continuous data flow. BPI acts as an interface beneath the sub-systems and thus forms a shared platform for data exchange.

By using industrial Ethernet at field and control level, automation components can also be integrated in the overall system. Digital communication, for example, enables advanced measurement sensor diagnostics, which can form the basis of effective process condition monitoring and preventative maintenance strategies, or calibration requests triggered in the ERP system.

Many of Endress+Hauser’s smart measurement sensors can be used to monitor process condition and verify measurement integrity. Simply look for the Heartbeat Technology logo. Several examples of Heartbeat Technology benefits are already used in the concentration processes in many copper and gold mines. For example in froth flotation tanks a Promass 100 Coriolis flowmeter will schedule a flocculant batch remix by measuring changes in the medium chemistry. The aim is to produce process optimisation and stability using a combination of smart sensors which monitor their own performance, indicate process anomalies and inform maintenance when cleaning or recalibrating are required.

Big Data made easy
In order to get close to the goal of maximum process efficiency at the lowest possible cost, intuitive and reliable process asset management is crucial. To facilitate this, Endress+Hauser offers Big Data asset management software that is vendor neutral. The cloud-based asset management toolbox, W@M, has proven beneficial to management executives, maintenance personnel, process engineers and metallurgists in generating plant wide process improvements and providing relevant and reliable data on process performance. A simple example is a ten percent proven increase in heap leach and stripping performance in a copper mine when it introduced W@M’s powerful capability to monitor variations in performance of critical measurement parameters such as acid usage, PLS output, organic to aqueous stripping rates against pipeline breakage, filter rupture, and other process imbalances.

In short, what does the software deliver that is Industry 4.0 or IIoT ready?

- Quick, visual and targeted access to the right data exactly when it is needed.
- Easy to download cloud-based tools including apps for mobile devices.
- Wireless and wired connectivity to smart sensors and other process equipment for diagnostics, verification and condition monitoring

“Our customers are sometimes surprised to find that for their first implementation of Industry 4.0 they do not need to completely revamp their operation,” explains Endress+Hauser industry manager, Susan Buitendag. “The fourth industrial revolution is in fact more a gradual evolution than a big bang approach to change. We at Endress+Hauser take pride in being an innovative company and our engineers keep us ahead of the game when it comes to smart sensor development. This means that the first step towards Industry 4.0 and the ‘digital mine’ is a small one for our customers.”

For more information contact
Dhiren Naidoo, Endress+Hauser,
+27 11 262 8077,
dhiren.naidoo@endress.com,
www.endress.com

“...the first step towards the IIoT has to be the integration of this data to open up its real potential.”
For over 20 years, Rockwell Automation 1336 drives have delivered the drive control required across Mozal, an aluminium smelter near Maputo, Mozambique. Now the industrial automation leader is in the final phase of upgrading this plant-wide drive layer with its Allen-Bradley PowerFlex 755 AC drives, bringing the feature-rich functionality of its flagship drive technology into Mozal’s production architecture.

In addition to lowering the risk of system downtime in the future and improving the plant’s long-term reliability, far greater process intelligence leading to massive gains in diagnostic capabilities, greater energy efficiency, and enhanced hardware and software support are among the benefits gained with this technology upgrade.

With the PowerFlex 755’s intuitive HMI providing on-demand error reporting and diagnostic information, plant maintenance teams will have greater intelligence allowing them to fault-find faster and more efficiently and therefore reduce maintenance downtime.

“The PowerFlex 755 delivers a high level of actionable intelligence at the fingertips of maintenance teams, allowing them to diagnose and correct process issues without having to search and consult technical literature to understand the meaning of errors, where they occur, and how they should be addressed,” explains Teboho Matlolane, project engineer, Rockwell Automation Sub-Saharan Africa.

Other integrated functions, such as the drive’s TorqProve feature, enhance site safety on the many different crane and hoist applications across the smelter. Used to optimise control of load handling and lifting, this feature includes a continuous brake slip monitor that detects load slippages and will automatically hold and safely lower the load.

“With many previously separate control functions, such as brake choppers, now integrated into the PowerFlex 755 drives, the amount of hardware required by the overall drive system has been reduced,” explains Phineas Ratshosa, project engineer, Rockwell Automation Sub-Saharan Africa. “A streamlined, more direct and integrated drive architecture doesn’t just lower the physical and energy footprint required by the hardware, it further optimises maintenance and diagnostic efficiency for the plant.”

Production-sensitive migration
Beginning in 2014, with the scope of the migration numbering over 350 new drives, combined with the requirement of minimising any impact on operations, the migration has been done in four phases, each targeting one or more of the following plant areas: the Castline Tending Assemblies (CTAs); Trailer Loaders; Casthouse; Furnace Tending Assemblies (FTAs); Pot Line Tending Assemblies; Stacking and Transfer Cranes; and the Rodding Shop. There are many diverse positioning and hoisting machines in these plant areas, each requiring a unique solution. The migration continues to date and is scheduled to be completed in November 2020.

Rockwell Automation implemented a planned migration within the plant’s maintenance schedule to keep plant shutdown to a minimum. This required precise communication, planning, preparation and execution between Mozal Aluminium, South 32, Rockwell Automation and other third-party service suppliers.

In a streamlined and efficient installation and commissioning routine, Rockwell Automation, together with its local panel manufacturer Temoc, assembled the new MCC buckets of the drives and ancillary hardware, testing each component individually, prior to integrating the new buckets into the existing panels.

For Rockwell Automation, it is another demonstration of the company’s intelligent, Industry 4.0 hardware, optimising production and operations efficiency in Africa’s mining and metals industries.

For more information contact Michelle Junius, Rockwell Automation, +27 11 654 9700, mjunius@ra.rockwell.com, www.rockwellautomation.co.za
TBM031
Clamp Meter
600A AC

- Jaws: 25mm conductor size Ultra-slim 600A AC
- Display: 3- 5/6 digits, 6,000 counts
- Probe-Contact
- EF-Detection for more precise indication of live

**COMBO 3**
Electrician’s Backpack

ELKBP - 20 piece Backpack
HT2BK - Insulation tape (10 rolls)
K300 - Pre-Insulation Terminals Kit
T50LBK - Cable Ties (8K)
H100A - Heavy duty hacksaw

**LAUNCH PRICE**
R990

**+FREE**
1 x Cable ties packet
10 x Insulations tape rolls
1 x Terminal kit
1 x Hacksaw

Visit your nearest wholesaler for more great deals!

---

**Weekly Competition:**
Win a R500 gift voucher!

Buy one of the products on promotion and stand a chance to win a R500 gift voucher every week for the duration of the promotion. You can enter as many times as you like but only one entry per product sold. Take a selfie and post it on our Facebook page using hashtag #Hellerwin

To qualify the selfie must include:
- Yourself;
- Purchased product from this promotion

**Grand prize:**
Win R25,000 worth of HellermannTyton tools and instruments.

All entries received from the weekly competitions are eligible for the grand prize.

(TB&C apply. All prices include VAT. Images are for illustration purposes only and actual product may differ.)
TLT-Turbo Africa has been awarded the contract for the supply and installation of a turnkey solution for underground ventilation and fumes extraction for Kamoa Copper SA, located in the DRC. Kamoa Copper SA forms part of the Kamoa-Kakula copper project, a joint venture between Ivanhoe Mines, Zijin Mining Group and the Government of the DRC, which has been independently ranked as the world’s largest, undeveloped, high-grade copper discovery.

TLT-Turbo Africa will design, manufacture and supply a bifurcated axial flow fan station for the extraction of mine fumes as well as auxiliary and booster fans for Kamoa’s underground operation. It will also oversee installation and provide assistance with the commissioning. The Kamoa Copper ventilation project is the first of many projects of strategic importance within the sub-Saharan Africa region that the company is involved in.

The contract was secured in October 2018, with commissioning due to begin in July 2019. TLT-Turbo Africa was appointed by DRA Projects, which is handling EPCM on the project. DRA managed the tender process and is currently overseeing the execution phase.

According to TLT-Turbo’s Madeleine Pretorius, the project presents unique challenges from a logistical point of view. The site is remote, and it involves multiple border crossings and often poor road conditions. Pretorius states: “This means complicated logistic solutions. TLT-Turbo has the benefit of a broad suite of options to minimise the complexity of abnormal loads.”

She adds that the offering and approach positions them as a preferred supplier for ventilation solutions in challenging locations: “We provide an energy efficient solution where power costs are high, and availability can be erratic. Our products are designed for long-term reliability and durability, with simple maintenance requirements and minimal down-time, which is critical for projects in remote locations.”

Mike van Oerle, sales manager at TLT-Turbo Africa, says that the company’s approach will provide several benefits to Kamoa’s operations. This includes standardised equipment that is designed for simple installation and maintenance, which means that the fans can be maintained on site, without the need for costly expert inspections. TLT is providing highly efficient products to meet Kamoa’s interim ventilation and power requirements, with flexibility for future re-deployment at an alternative ventilation position.

Both van Oerle and Pretorius assert that delivery of the scope of work on this specific project speaks to TLT-Turbo Africa’s capabilities and expertise. The collaboration with DRA has paved the way for excellence in service delivery. “Working with an experienced EPCM company such as DRA, our project team is able to draw on their unparalleled knowledge of the sub-Saharan African mining environment. Both teams work together to provide solutions that address the challenges experienced by our customers;” adds Pretorius.

“Our ability to understand customer requirements led to a cost-effective solution, focusing on total cost of ownership,” concludes Oerle. “Combining this with an experienced project execution team means that we can ensure Kamoa receives quality products and on-time delivery.”

For more information contact Vusi Madlopha, TLT-Turbo Africa, +27 11 871 6600, vusi.madlopha@tlt-turbo.africa, www.tlt-turbo.com
Siemens extends the Simine portfolio

Siemens has extended the Simine portfolio for high-pressure grinding mills (HPGR) to include a new controller. Plug-and-play functionality makes the load share controller available for immediate use. The web-server based operator interface allows the process engineer at any time (on-line and off-line) to adapt the controller parameters and thus optimise the torque distribution. The controller is already being successfully used by one customer, where tests done before and after optimisation have demonstrated significant benefits for the mill.

The new controller follows an established scheme. During startup of the HPGR, it is inactive, but once a certain torque level has been reached, the controller takes over the load share regulation. If the controller is not ready for use, for example in the event of disruption, the drives do not start. However, operation without load sharing is available and in this case the drives take the speed reference from the mill automation.

Variable load distribution

The load distribution between the rollers in an HPGM is generally 50:50. The master follows the speed command and the slave follows the torque of the master. If an alternative load distribution is required, it is possible to change the load distribution between the drives using the load distribution factor. The reference torque on the slave drive is then decreased or increased compared to the reference torque of the master drive. At the same time, the load share controller maintains the speed difference between the rolls within given limits. Via the web-server based operator interface, the process engineer can adjust the load share factor and limitation for speed difference at any time – even during grinding operation.

Successful utilisation

KHD Humboldt Wedag, an OEM in the cement and mining industry, is already using the load share controller in its Conakry project. Before and after tests show the benefits of using this controller: amongst other things, changes in the roll gap and roll pressure could be kept in a substantially smaller range.

For more information contact Jennifer Naidoo, Siemens Digital Industries, +27 11 652 2795, jennifer.naidoo@siemens.com, www.siemens.co.za

SKF solution saves capex for mining customer

When a long-standing customer in the platinum sector required assistance to salvage its spherical roller bearings, SKF came to the fore. Through its in-depth remanufacturing expertise and capabilities, it was able to refurbish twelve pallets of bearings for the customer. The replenished bearing stock not only delivered substantial savings on Capex, but also improved operational uptime for the mine in Limpopo.

“As a global bearing and rotating technology specialist, SKF is committed to delivering best-in-class solutions to meet a customer’s individual requirements,” says account engineer, Reinhardt Joubert. “We work in close collaboration with our authorised distributors who are located close to customers, and we recognise that they are the face of SKF. Therefore, over the past five years we have invested into growing and upskilling their sales teams to align with SKF product and service quality.”

In Q1 2019, SKF distributor, Bearing Services Lydenburg, was contacted by the customer who, due to limited storage space, had no option but to store their bearings outside where they were exposed to the environment for an extended period of time. Well-equipped with SKF knowledge, Bearing Services Lydenburg advised the mine of the value and financial benefits offered by remanufacture compared to the costly exercise of purchasing new replacements.

Acknowledging these advantages, the customer readily agreed with the suggestion to have the bearings inspected by SKF specialists at the company’s Reman Centre in Jet Park. Of the 29 that were assessed, SKF was able to restore 23 units back to OEM quality.

Thanks to SKF’s cost-effective remanufacturing solution, the customer is now able to draw from these bearings ex-stock as and when required, reducing running and maintenance costs as well as improving uptime at the mine. “Our premium remanufacturing capabilities have served to cement the mine’s trust in SKF’s abilities and the project has also strengthened our relationship with our authorised distributor,” concludes Joubert.

For more information contact
Samantha Joubert, SKF South Africa,
+27 11 821 3500,
samantha.joubert@skf.com,
www.skf.com

For more information contact
Samantha Joubert, SKF South Africa,
+27 11 821 3500,
samantha.joubert@skf.com,
www.skf.com

For more information contact
Samantha Joubert, SKF South Africa,
+27 11 821 3500,
samantha.joubert@skf.com,
www.skf.com

Successful utilisation

KHD Humboldt Wedag, an OEM in the cement and mining industry, is already using the load share controller in its Conakry project. Before and after tests show the benefits of using this controller: amongst other things, changes in the roll gap and roll pressure could be kept in a substantially smaller range.

For more information contact
Samantha Joubert, SKF South Africa,
+27 11 821 3500,
samantha.joubert@skf.com,
www.skf.com

For more information contact
Samantha Joubert, SKF South Africa,
+27 11 821 3500,
samantha.joubert@skf.com,
www.skf.com

For more information contact
Samantha Joubert, SKF South Africa,
+27 11 821 3500,
samantha.joubert@skf.com,
www.skf.com

For more information contact
Samantha Joubert, SKF South Africa,
+27 11 821 3500,
samantha.joubert@skf.com,
www.skf.com

For more information contact
Samantha Joubert, SKF South Africa,
+27 11 821 3500,
samantha.joubert@skf.com,
First introduced in 1977, Coriolis mass flowmeters have grown to become one of the largest markets in terms of worldwide revenue, second only to electromagnetic flowmeters. Their unrivalled ability to directly measure mass flow and density (and, indirectly, volume flow) with high accuracy and repeatability, low maintenance requirements, and suitability for use with a wide range of fluids, both liquids and gases, makes this a fast growing flow measurement technology.

With such fast moving technology it can be difficult to forecast the ‘next big thing’, but it is possible to focus on two recent developments that look set to influence the market in the near future: high capacity flowmeters; and the ability of Coriolis meters to measure liquids with entrained gas.

Sometimes bigger is better
For many years, the vast majority of Coriolis flowmeters supplied were less than 300 mm. As the technology matured, the demand for higher capacity meters steadily increased. Significantly, the rise in the price of oil drove demand for larger meters, particularly for applications in the upstream sector where high volume custody transfer is common. While the fall in oil prices in 2014 resulted in many oil and gas projects being cancelled, or postponed, the last few years have seen oil prices (and investment) on the rise again, and large line size Coriolis meters are firmly back on the order books.

Various designs have been developed to deliver high flow rates with accuracies to 0,05%. The majority of high capacity meters are based on the enlargement of existing designs so a medium capacity bent or omega tube meter is scaled-up to give two larger measuring tubes to accommodate larger flows. In another design, two twin bent tube meters mounted back-to-back give four measuring tubes that split the flow evenly. While these meters offer flow rates of up to 4 100 000 kg/h, both designs mean that the overall size of the meter envelope increases substantially.

The release of the twin straight tube flowmeter by Emerson in 1987 followed by the launch of the single straight tube meter by Krohne in 1994, were milestones in Coriolis evolution. Straight measuring tubes offer a number of advantages over bent and other shaped tubes, including lower pressure drop and better performance in abrasive and corrosive applications, especially with titanium tubes.

Krohne focused on the development of straight tube technology releasing a number of meters in this format and resulting in the 2008 launch of a range of twin straight tube high capacity meters. In 2017, to meet the demand from the oil and gas market, the range was augmented with the launch of a 400 mm meter featuring four straight measuring tubes with a maximum flowrate of 4 600 000 kg/h.

Another advantage of large straight tube meters is their compact installation envelope. In many projects, the diameter of the meter body is almost identical to that of the pipe, meaning that they can be fitted as part of the pipe run with minimum adaptations and lower installation cost. Their bent tube cousins with long belly drops often require complex pipe layouts to accommodate them, which adds to installation costs and increases pressure drop across the process. Straight tube meters can also be installed in tight spaces where other models simply would not fit and are particularly suited to offshore and other applications where space is at a premium such as metering skids.

Whether the size of Coriolis meters will continue to increase remains an open question. The technology to deliver larger meters already exists but currently the demand does not. Having said that, it is worth considering that not so many years ago 400 mm Coriolis flowmeters only existed as R&D projects.
Entrained gas and the challenge for Coriolis flowmeters

Entrained gas in liquid (two-phase flow) is present in many processes. Sometimes it is unwanted, having been introduced by mixers, leaking seals or by top filling tanks; while with some liquids, such as crude oil, it is present naturally. Many systems are designed to prevent or remove entrained gas, but this is not always successful, or even practical. In other applications, the addition of gas is a necessary part of the process. Air is added to many foodstuffs such as yoghurt and mayonnaise to give it a light texture. Accurate measurement is therefore important.

Two-phase flow causes problems for most flow measurement technologies. Some are unable to measure at all when entrained gas is present, while others will measure the gas as liquid giving a measurement error proportional to the gas volume fraction (GVF). Some will even stop measuring when the GVF reaches a certain level. Adding a further complication, changes in process conditions can cause the flow regime and GVF to shift making it difficult to predict and manage.

Entrained gas presents a particular challenge for Coriolis flowmeters that calculate fluid density from the frequency of the measuring tube as the fluid passes through it: the lower the frequency of the tubes the greater the density, and vice versa. During two-phase flow, the gas and liquid ‘decouple’ and move at different speeds through the flow tubes, which dampens the tube vibration. Varying process conditions also cause the flow regime, GVF and tube frequency to change rapidly.

In the past, this rapid change in frequency caused Coriolis flowmeters to ‘lose’ the signal from the sensors mounted on the measuring tubes. As well as giving wildly erratic and non-repeatable measurement, the meters would often freeze at the last confirmed reading, or go into reset mode having assumed that an internal error had occurred resulting in no measurement of the process. The leading Coriolis manufacturers have developed technologies that enable their meters to work with two-phase flow (albeit sometimes with limitations), but have come at the problem from very different angles.

In 2012, Krohne first provided a two-phase flow solution with the inclusion of ‘Entrained Gas Management’ (EGM) as a standard feature on its new MFC 400 transmitter that is fitted to all Optimass flowmeters. Using high speed digital signal processing and software-based algorithms, EGM makes constant and precise corrections to the tube driver level based on real-time frequency information received from the sensor and driver feedback. This allows the flowmeter to provide continuous and repeatable mass flow and density measurement with gas volume fractions from 0 to 100%. Although Krohne does not specify accuracy (the shifting nature of the flow regime and GVF make each application unique), it does point to the fact that EGM technology has been successfully proven in use for many years.

From this, it can be seen that when it comes to entrained gas there are solutions, but they cannot yet be considered perfect. However, with the market demanding highly accurate and repeatable measurement of liquids with gas volume fractions from 0% to 100% across the full spectrum of flow regimes this is one Coriolis technology area that is worth watching.

So what will be the next big thing in Coriolis mass flowmeters?

Is it bigger meters, accurate two-phase (or multi-phase) flow measurement, diagnostics, communication, or Big Data and the IIoT? Watch this space.

For more information contact Deon Rampathi, Krohne SA,
+27 11 314 1391, d.rampathi@krohne.com, www.za.krohne.com
PROCESS MEASUREMENT

Pressure transmitters for mobile equipment

In order to provide solutions for use in mobile equipment, Turck has expanded its portfolio of pressure sensors with the introduction of the PT1100/2100 transmitters. This includes mining, forestry, agricultural and building machinery. Compared to conventional machine building, the field of mobile equipment has more demanding requirements, particularly with regard to resistance to overpressure, vibration and shock, as well as increased EMC performance. The new pressure sensors of the PT1100/2100 series are specially optimised for this and therefore offer a robust solution for one of the sensor types most frequently used in mobile equipment.

The transmitters are available with protection to IP67 or IP69K. The compact design meets the requirements for shock and vibration resistance in accordance with the ISO 16750 road vehicle standard. Temperature fluctuations also only have a minimum effect on the measuring accuracy. Besides the M12 plug connectors, the series offers sector-specific electrical connection solutions, such as AMP Superseal 1.5 or Deutsch DT04-3P. The sensors operate in a wide power supply range from 7.5–33 VDC.

With a test level of up to 100 V/m the PT1100/2100 series guarantees optimum EMC performance, thus meeting the requirements of the following mobile equipment standards: ISO 13766 (earthmoving and building construction machinery), DIN EN 13309 (construction machinery), DIN ISO 14982 (forestry and agriculture), ECE R10 (automotive directive), 2004/104/EG (automotive directive).

For more information contact Brandon Topham, Turck Banner, +27 11 453 2468, brandon.topham@turckbanner.co.za, www.turckbanner.co.za

Temperature transmitter family for all industries

Endress+Hauser has introduced its first temperature transmitter with Bluetooth (BT) connectivity. This feature is unique because it does not require a BT modem to be able to communicate with the device as the modem is integrated inside the transmitter. This BT LE feature has low power consumption and users can access their instruments from up to 50 metres away.

The new iTemp TMT71 is a normal analog transmitter with optional BT, while TMT72 is equipped with latest HART 7 versions and advanced diagnostics according to NAMUR NE107. TMT71 and TMT72 are designed for use across different industries where applications require accurate temperature measurement and long-term stability to help improve process efficiency and increase plant availability. This is ensured by features like low drift (0.03% of span), corrosion monitoring, low voltage detection etc. The transmitter also has event simulation possibility to help with commissioning and troubleshooting. These universal transmitters are available in both head and DIN-rail mount and come with ATEX and IECEx approval.

For more information contact Endress+Hauser, +27 11 262 8000, info@za.endress.com, www.endress.com
Pure & tireless measurement
The new G 1000 product series
Accurate bulk flow measurement in the cement industry

The rapid development of sensor technology provides cement producers with a toolbox of solutions to optimise performance and strengthen market presence. Non-contact volume flow measurement of conveyed materials streamlines the handling process from quarry to final product.

SICK Automation’s bulkscan flow measurement technology had its portfolio broadened recently with the introduction of the low cost Bulkscan LMS111. All versions provide non-contact measurement of volume flow more accurately than mechanical belt scales, while minimising errors in mass and volume flow calculations.

Background
Felix Bartknecht and Michele Savino of SICK, Germany, explain that the movement and handling of bulk materials and packaged cement are tasks mainly carried out by conveyors. In many established cement plants this movement happens unsupervised. Add to this the need for lower production costs and enhanced tracking accuracy, and the need for cement plants to keep up with modern sensor technology becomes obvious. Bulkscan provides automated monitoring and process control all the way from the quarry to the end product.

The cement industry can learn from Industry 4.0 experience in other sectors. One of the key aspects is the ability to take data from process sensors to a centre that can evaluate it and recommend closed-loop process changes. Data can be stored and evaluated over time to spot patterns and determine trends. Attaining this level of accessibility to information increases the potential for process improvements, as well as opening up opportunities to assess and respond to consumer trends and environmental requirements.

Monitoring flow in cement plants
Knowing how much raw material is in the yard is a challenge. It is essential that conveyors provide a nonstop flow of raw materials, additives, fuel, clinker and cement upstream and downstream of the pyroprocess. Mechanical scales measure mass and the volume of material transported is calculated using an average material density.

This process is hindered when material density changes or when a conveyor belt is not properly maintained. Material density is used to convert mass from the weigh scales into volume and vice versa. “When the density is incorrect, the volume and mass calculations are also incorrect,” explains Savino.

The solution
Bulkscan flow measurement technology enables the yard manager to measure the contour, volume, height and material distribution through the use of LiDAR (light detection and ranging) technology. The sensors can be mounted over conveyor belts or onto cranes and reclaimers.

Inside the Bulkscan sensor, high-pulse laser beams create a profile of the material on the conveyor which, in combination with belt speed, represents volume flow and calculated mass flow. This measurement principle is based on a laser beam that is deflected internally across a rotating mirror. The sequential order of the laser pulses is synchronised with the rotation frequency of the motor and the desired angular resolution. Generally, the motor rotation speed is determined by the maximum emitted pulse frequency of the laser source and the desired angular resolution. The laser beams scan the surface area of the material on the conveyor and send this information to the measurement device, which compares the data with an empty reference belt.

Bulkscan allows plant operators to measure volume flow on conveyor belts, bucket elevators or drag chain conveyors, outdoors in harsh conditions, as well as inside the cement plant. The scanner can be mounted above the conveyor, measuring volume flow without any material contact, making it virtually maintenance free. The collected data can either inform manual processes, or act as an input to fully-automated systems to drive changes in material flow and composition. When large objects are detected, the plant operator is alerted and an automated stop process is triggered.

Process optimisation
Bulkscan helps plant operators to optimise conveyor operation and reduce unplanned downtime. The same laser beams used to measure the bulk flow rate also provide information about the exact height and distribution of the bulk material on the conveyor. In addition, the centre of gravity of the load and the distance between the bulk material and the conveyor edge is measured and provided to a closed-loop system to adjust material distribution on the belt. This process automation helps increase belt life and decrease one-sided roller wear and downtime.

Bulkscan can also be used in conjunction with a weigh scale. The actual bulk density can be determined in real time as the device measures the volume while the weigh scale measures mass. When these values are known, density can be calculated.

For more information contact
Robert de Scande, SICK Automation
Southern Africa, +27 10 060 0550,
robert.desconde@sickautomation.co.za,
www.sickautomation.co.za
Flow sensor for liquid media

The new flow sensor SFAW from Festo is ideal for monitoring cooling circuits, for example in welding guns in the automotive industry as well as in front-end applications in the semiconductor and electronics industries. The sensor measures the flow rate, consumption and temperature of liquid media within the ranges of 1.8 and 32 l/min, and 5 and 100 l/min. The sensor is designed for neutral liquids and water applications. It can handle media temperatures up to 90°C and viscosity of up to 2 mPa.s.

A great view in every position: whether installed horizontally or vertically, the sensor housing and display can be easily rotated and aligned – even after they have been fitted.

Sensor and connections can be purchased separately: the modular concept enables the sensor and connections to be purchased separately, ensuring maximum flexibility during assembly. It also allows users to standardise on parts without difficulties. The sensor can be changed quickly and easily without the need for special tools.

Easy to use

Thanks to a large, easy-to-read, blue/white/red LCD display, users can immediately see the flow rate. The SFAW has built in NPN/PNP/NO/NC options with analog outputs or IO-Link giving freedom of choice in terms of evaluating the output signal. It can also be commissioned quickly by means of teach-in or using the clear 3-button menu function.

The IP65 study design enables the SFAW to be used in harsh environments, while the modular electrical output concept makes it extremely flexible, allowing simple integration into various control systems. The housing can be turned 360° and the display 340°, making the sensor quick and easy to align and the display easy to read.

For more information contact
Kershia Beharie, Festo,
086 003 3786,
kershia.beharie@festo.com,
www.festo.co.za
In any industrial paint or powder coating operation, getting the paint cure correct is critical to both the physical and cosmetic performance of the product. To get the best out of the coating, it is essential that the cure schedule achieved in the oven matches that recommended by the coating supplier. Getting the bake wrong can be catastrophic, leading to the risk of rejects or costly rework. Not getting the cure schedule correct can increase costs significantly, affecting the entire operation including labour, energy consumption and the risk of lost business.

It is quite common for companies to over cure their products to avoid premature coating failure. However, this may create discolouration, adhesion and chip resistance problems. Another issue that is often overlooked is that the oven is adding to operating costs. In the worst case, many coaters still have no means of accurately determining what their product temperature is in-process, relying on oven set-point monitoring using the ovens thermocouples for process control. As many have learnt to their cost, one oven program (bake time and temperature) does not satisfy all. To be able to control the oven, an oven profiling system is essential for maximising process efficiency and getting the most out of the cure oven.

The DataPaq EasyTrack3 is an excellent example of one of the many DataPaq oven temperature profiling systems that can be used for such purposes. Designed for ease of use, rugged, reliable and affordable the system is ideal for even the smallest of coating operations.

The DataPaq EasyTrack3 system is the third generation of the EasyTrack brand, first introduced in 2000. The system provides the coater with more choice and improved operating capability. A variety of systems have been developed around the new core ET3 logger, working with EasyTrack software to match the exact operational needs of the user.

The system is offered with a range of thermal barriers designed to match different application coating requirements. Proven to keep the logger safe through the process and maintain temperatures at guaranteed accuracy levels, a low height barrier is available designed to allow profiling of typical mesh belt cure lines where oven clearance is significantly restricted.

Collecting temperature profile data is one thing, using it to make intelligent process decisions is quite another. For this reason, the EasyTrack software allows users to make informed decisions to either validate the performance and product quality or show what actions are required to rectify problems.

For more information contact
R&C Instrumentation, +27 11 608 1551, info@randci.co.za, www.randci.co.za

WIKI now offers OEM manufacturers the miniature float switch model RLS-7000/8000, particularly suitable for level monitoring in small tanks. The performance and design meet the requirements of original equipment manufacturers for reliable as well as economical components.

In addition to the standard version, design-in solutions are also possible: The model RLS-7000/8000 can be adapted to the respective application through customisation of design, as well as tank and electrical connections. The switch can be installed vertically (RLS-7000) or horizontally (RLS-8000). Its switching function, normally open or normally closed, can be reversed by rotating the float body (RLS-7000) or the complete instrument (RLS-8000) through 180°.

The new float switch has been designed for a long service life and is available in a variety of robust and chemically resistant plastics with very low water absorption. Its reed contacts provide up to a billion switching cycles, depending on the application.

For more information contact WIKI Instruments, +27 11 621 0000, sales.za@wika.co.za, www.wika.co.za
Foxboro IGP05S Intelligent Gauge
Pressure Transmitter: IGP05S-T22E5AA-L1
- Reference accuracy ±0.075% of span
- 400:1 turndown
- 4-20mA with HART 7 communication
- ATEX approval
- SIL2 standard
- 2-year standard warranty
- Manufactured in the USA

Priced from R 8 995 excl. VAT
Standard and Premium performance options available

Foxboro IDP06S Intelligent Differential Pressure
Transmitter: IDP05S-T22B15AA-M1L1
- Reference accuracy ±0.075% of span
- 400:1 turndown
- 4-20mA with HART 7 communication
- ATEX approval
- SIL2 standard
- 2-year standard warranty
- Manufactured in the USA

Priced from R 10 995 excl. VAT
Standard and Premium performance options available

Foxboro SRD998 Intelligent Positioner :
SRD998-HBD0-B0S-1SA17-A1
- 4-20mA with HART 7 communication
- Self diagnostics, status- and diagnostic
- Single acting
- Auto-start with self-calibration
- Easy local operation with rotary selector
- Protection class IP66
- ATEX approval
- Manufactured in France

Priced from R 11 995 excl. VAT

Foxboro SRD991 Intelligent Positioner :
SRD991-BDFS7EA4NR-V01
- 4-20mA communication
- Self diagnostics, status- and diagnostic
- Single acting
- Auto-start with self-calibration
- Easy local operation with key pad
- Integrated position feedback
- Protection class IP65
- ATEX approval
- Manufactured in France

Priced from R 14 995 excl. VAT

**Process Automation Solutions**
Representing Foxboro in Southern Africa
contact@eoh-pas.co.za Tel: +27878039767
www.eoh-pas.co.za | www.foxboro.co.za
At the recent ARC Industry Forum in Orlando, Florida, many discussions revolved around digital transformation. According to a presentation by Mike Williams, ARC Associate, although industry research indicates that there has been more than 75% of the process industry participating in Industry 4.0 technology evaluation or pilot projects, there is still less than 25% of the industry moving beyond the pilot phase. It would appear that the process industries are lagging behind other industry segments such as automotive and other discrete manufacturers.

According to Williams, “Many times pilot projects find technically viable solutions, but come up short in creating a business case that would allow the CEOs and CFOs to demand more investment. The question raised here is why?”

**Digital transformation in the process industry**

In his presentation, Williams identified some of the top challenges facing early digital transformation implementation. These include:

- Lack of a concrete value proposition to justify investment.
- Islands of information prevalent in existing infrastructure.
- Lack of seamless integration between IoT and OT solutions.
- Reliability issues resulting in random periods of abnormal faulting in real time.
- Conflicting organisation design issues between IT and OT roles and responsibilities.
- Lost tribal knowledge – “How do we capture and digitise knowledge before it is gone?”
- Cybersecurity issues resulting in IP theft or denial of service.
- Need to upgrade skills and human assistance tools to improve efficiency, enhance decision-making and higher employee engagement.

Although the deployment of new Industry 4.0 technologies might improve asset utilisation, one of the most pressing issues in the process industries, this alone does not make or save money for the enterprise. The newly available capacity must be put to good use, such as by filling production orders for newly developed products.

**BASF’s experience with digital transformation**

Michael Krauss, senior expert, control systems technology for BASF, began his presentation by acknowledging that requirements in the process industries, oil and gas and chemicals in particular, are different than in discrete manufacturing. Many of the process industry value drivers are centred around improving work efficiency and avoiding incidents. He commented that for companies like BASF, revenue-per-employee has an important impact on the bottom line. “Energy and raw material are key factors in the early steps of the value chain, and safety is important above all.”

A BASF initiative that utilises bar coding and mobile digital devices provides necessary information about every asset in the plant to operators, maintenance personnel and material managers. Of course, this requires that key vendors must help make this information available digitally. The vendor list includes the automation systems suppliers such as ABB, but also extends to other areas such as maintenance, engineering and the enterprise. Some examples of where BASF has deployed digital technologies were provided, these include:

- Using a drone to measure the thickness of a tank’s wall.
- Automatically scanning workers when they enter a facility to ensure that they are wearing the necessary protective clothing and other gear.
- Analysing the welds on all control valves deployed.
- Utilising advanced analytics with vibration monitoring and other sensors to monitor pumps.
- Performing predictive maintenance to avoid heat exchanger fouling and improving the reliability of pumps and compressors.

BASF also produced a video to highlight two key technologies in what it refers to as Maintenance 4.0: First, the use of Microsoft’s HoloLens technology to allow personnel on site to contact remote experts about problematic plant equipment; and second, the use of additive manufacturing (3D printing) to not only produce a part, but to enable the freedom of design to improve it.
Dow Chemical’s digital transformation starts with MES
Angela Morris, MES global improvement leader at Dow Chemical, used a symphony orchestra analogy to describe Dow’s history and progress in manufacturing execution systems. Dow began its digital transformation in 2008, addressing the need for vertical integration between the enterprise and the shop floor. Early on in this journey, ARC Advisory Group’s consultants helped the company identify the value-creating use cases and define the functional requirements needed to address the operational technology (OT) gaps between the company’s new ERP solution and highly diverse shop-floor assets. (Dow’s vertical integration project was a response to end-of-life issues with legacy MES systems, which were architecturally incompatible with the new ERP solution.)

One of the key learnings from the program was the barrier of reinvestment cost. Much like the BP experience, the solution required incremental value creation with phased reinvestment to be successful. Given the technology constraints at the time, and existing architectural compatibility issues, the full value of vertical integration was not realised and the program was placed on hold. However, much of the front-end analysis of functional requirements derived and economic justification has been leveraged into a restructured effort under the Industry 4.0 banner using new breakthrough technologies such as virtualisation and analytics. The MES-installed base is now being repositioned for duty as edge services supporting enterprise-based real-time execution applications.

Morris explained that if an Industry 4.0 application needs to have real-time performance, providing legacy MES servers at the edge may be the answer. He further stated that MES systems can play a role in the digital transformation of the manufacturing shop floor by “bridging the reality of the installed base, which most likely will remain for a long time, to the innovative ideas and capabilities of Industry 4.0 solutions.”

For more information contact Paul Miller, ARC Advisory Group, +1 781 471 1141, pmiller@arcweb.com, www.arcweb.com

Faster results with a digital twin

The high-tech company Grenzebach’s portfolio includes the simulation of material flow in complex plants in the glass industry, which it achieves using Siemens simulation solutions. Together, the two companies have developed the most recent product from Grenzebach, the tin-air speed stacker, a machine for stacking all types of glass sheet. This expertise has produced a Siemens digital twin that allows all the functions and permutations of the stacker to be simulated, while simultaneously developing the initial motion control program to provide an optimum starting point for virtual commissioning. By running what were previously sequential development steps in parallel, it was possible to reduce both development times and costs significantly.

The stacker is a three-axis system that can selectively pick up glass sheets, from the tin side or the air side, and place them vertically on a glass rack — up to 20 times a minute. This represents a 30 percent improvement in stacking performance and makes the tin-air speed stacker the most powerful of its type. The motion control is provided by a Simotion D445 system with the Handling Advanced universal library, as well as Sinamics S120 modular converters and Simotics S servomotors. Grenzebach was venturing into completely new ground with this development. “In order to get to grips with the potential singularities of the kinematics, which were similar to those found in articulated robots, we decided to build a digital twin for the first time,” explains Roland Jenning, head of Innovation at Grenzebach.

Erring on the side of caution
The digital twin was produced using the NX Mechatronics Designer from Siemens PLM Software. The initial motion control programs were created at the same time as the digital twin, which reduced the development time and time-to-market significantly. To make the simulation of the programmed movements in the digital twin as close to reality as possible, Grenzebach chose a ‘hardware in the loop’ design in which the control is connected to the kinematic modal in NX via a Simit simulation unit. The program is then tested using the Simotion Scout engineering system: Simit picks up errors and highlights weak points. This allows processes to be optimised long before the first actual commissioning. However, this is not the end of the digital twin’s usefulness. Future modifications to the plant or changes to the product can be played out virtually in advance and checked for errors without disrupting operations.

For more information contact Jennifer Naidoo, Siemens Digital Industries, +27 11 652 2795, jennifer.naidoo@siemens.com, www.siemens.co.za
Does edge computing have the edge?

Implementing artificial intelligence in industrial manufacturing

In the manufacturing arena, people and machines have a symbiotic relationship. They depend upon each other for their performance and for future improvements. People are increasingly making better machines, most recently through the use of affordable and innovative automation solutions based on powerful hardware and software. These advanced machines in turn help people to be more productive, bringing advantages to society by providing more value up the value chain.

Artificial intelligence and the cloud vs the edge

Two technological advances that are playing a vital role in the improvement of machines are cloud computing and edge computing. Cloud computing is the storage, management and analysis of data that is stored remotely on a server either locally or on the Internet and has become commonplace in a short time. Although it has proved invaluable in many circumstances, it is always the best solution for businesses, and in particular for the production line? Recently another promising alternative has emerged: edge computing.

Edge computing enables data storage, applications and analysis to be carried out at the edge of a machine. Whilst there are various interpretations of what the edge entails, data mining at the edge can be compared to a spinal reflex. Lines and devices are monitored with real-time sensors, and data at the machine level can be processed in microseconds. A machine’s condition can be monitored in real-time, but the data volume is limited. Real-time data processing at the edge also enables an immediate response.

Industrial manufacturers need to think carefully before deciding on which of these two options will be the most effective, taking into account the recent arrival of new solutions involving artificial intelligence (AI) and machine learning (ML). Omron has demonstrated how AI can be incorporated into machines by developing Forpheus, the world’s first robot that can play and train people in table tennis.

Forpheus embodies Omron’s three-fold philosophy for innovative automation: integration, interaction and intelligence (specifically AI). The robot uses its cameras and sensors to observe the mood and movements of the player and the ball. It can then rapidly analyse this data to anticipate how the opponent will hit the ball and its trajectory, so that it can then hit the ball back. By assessing how its opponent plays, it can determine their skill level and modify its own play so that its opponent has a challenging game. This is an example of how smart machines could be used to train and assist people in the manufacturing industry, making the most of their potential.

However, although AI offers great potential benefits, care needs to be exercised before incorporating it into industrial applications. All too often, companies are eager to start implementing and using AI without being fully aware of the challenges they could face. So, what are the key issues involved in deploying AI and in determining how AI can improve a production line or a process, and if cloud computing or edge computing should be implemented?

Issue 1: What’s your problem?
The biggest challenge that companies face is that they often don’t know what problem they want to solve. Some of them aren’t measuring any data yet, so even though they might be keen to implement AI, this will prove difficult without the necessary data. The solution is to start collecting and cleaning data first, before even thinking about introducing AI. You can then start trying to obtain information from the data and begin visualising this in a smart way. This is basic data science and will help your company to start realising a range of benefits.

One difficulty here is that a lot of existing data isn’t suitable for analysis, as it is contaminated, duplicated or scattered, or there is key information missing. There is huge potential for the use of new technology, but you can only use it if the data you are gathering is both sufficient and correct (which involves making sure a lot of attributes are right). If you are starting to think about AI, you also need to think in a broader sense about data science and what and how much data you need before coming to a conclusion. Even then, you will need a substantial amount of data if you want to reach the right conclusions.

The next step is to consider implementing AI. You can apply AI at various levels, depending on the problem you want to solve. For instance, if you want to compare the performance of two factories, you can gather the data and put it into the cloud (inside or outside your enterprise), and then you can compare and analyse the data and start to draw conclusions.

At the other end of the spectrum, you might want to analyse the performance of a machine that isn’t meeting your full specifications. This can be difficult in a mass production scenario. For example, a manufacturer who is providing parts for the automotive industry might need to generate 100 000 items per day,
The infrastructure: How much will the need to be addressed from the start are: enhance its capabilities? The key questions that could provide? How can a manufacturing plant access and analyse the data that a machine The machines within a factory are a potential issue 2: How can you access and make its performance. The problems you face will determine what you need to do. For instance, do you need to look wide, at a lot of data? If you want to compare a large amount of data from 20 factories, this is where AI in the cloud can play a key role. If you need an immediate reaction on a bottling line for example to avoid scrap, you should consider a solution with AI at the edge.

Issue 2: How can you access and make the best use of your data?

The machines within a factory are a potential source of valuable data. But how can users access and analyse the data that a machine could provide? How can a manufacturing plant then make the most effective possible use of this data, especially when introducing AI to enhance its capabilities? The key questions that need to be addressed from the start are:

- The data: Do I have enough data, and if so which data is the most relevant and how will it be used?
- The infrastructure: How much will the infrastructure cost?
- The outcomes: What problem do I really need to solve and what increase in efficiency can be achieved by the use of cloud or edge computing?

Some manufacturing facilities might decide to send all data to the cloud. Large IT companies are promoting the cloud as the solution to everything. However, it is not a complete panacea as it does not show or respond in real-time to what is actually happening in the machines. Omron is developing tools to help the human brain to cope with the challenges of what is happening inside the machines, along with details of downwards analysis and pattern recognition.

One of the potential drawbacks of using cloud computing in the factory is that it can be difficult to gain a true picture of the real-time performance of equipment. There is no way of looking inside the machine to see what is happening. However, in edge computing within an industrial manufacturing environment, you can look at the actual process within the machine. Real-time data processing at the edge enables an immediate response to an abnormal situation in a process. With AI at the edge, manufacturers can control complexity and security. To translate information into action, manufacturers need efficient control and monitoring for a more natural, proactive relationship between operator and machine.

With edge computing, the data and the computing resources are located close to the machines. This enables users to gain real-time information about the efficiency of different aspects of their industrial automation system. This means that they can access intelligence within the machine, which in turn enables deep analysis to be carried out.

This information is both scalable and measurable and enables the factory to achieve a significant increase in its overall equipment effectiveness (OEE). Manufacturing companies are increasingly recognising that AI can make a major contribution to their profitability by increasing their OEE, which in turn will lead to greater productivity and lower costs.

In this way, AI can contribute to direct and immediate results because the intelligence is incorporated within the machine rather than being located elsewhere. Users can focus on potential issues in the process using the real-time data from the system and its components. Omron’s AI Controller has some pre-programmed tools that can help with simple cases of preventative maintenance. Using advanced mathematics, it can detect a problem or a deterioration in part of the equipment before a machine breaks down. However, with more complicated machines and with problems which involve more detailed use of AI, currently you will need specialists with advanced skills, such as data scientists and software engineers, if you want to extract the maximum value from this new technology.

Issue 3: How secure is your data?

In terms of understanding what is happening in machines in a manufacturing environment, cloud computing is a simplistic approach that is often insufficient to meet the needs of the latest technology and machines for several reasons.

Using the cloud can cause problems in terms of security, particularly in relation to compliance with the latest IEC 6243 cybersecurity standards. These are becoming increasingly important in industrial situations, and relate to the security, safety and integrity of the components and systems used within industrial automation programmes.

In contrast, edge computing within the factory provides another level of security, as the data resides within the machines. The whole industrial automation process can be secured using solutions such as intruder detection, video monitoring and access control systems.

Conclusions

In a traditional machine control environment, it has been impossible to programme a machine to recognise micro-second skill patterns in the local data that might be entering it. Potentially all machines have this information but until recently it has been ignored. However, the introduction of AI solutions at the edge inside the machine now provides you with tools that enable you to look at that data. Advances in technology mean that you can have machine control equipment that will process that data and recognise patterns within it.

Although edge computing has some distinct differences from cloud computing in the manufacturing arena, it does not have to be a complete substitution for cloud computing. The two can co-exist as they complement each other in many ways. In some situations, computing might take place in the cloud and then be transferred to edge devices.

Which is the most effective solution for a factory that is starting to use AI - cloud computing or edge computing? Both have a valuable role to play in manufacturing, but it seems clear that in terms of using AI in the production line, edge computing really does appear to have the edge.

For more information contact Omron Electronics, +27 11 579 2600, info.sa@eu.omron.com, www.industrial.omron.co.za
Supplying critical DC loads safely, increased system availability, confined spaces, and tough ambient conditions present system designers and operators with a variety of challenges. New DC UPS models from Phoenix Contact’s Trio Power series offer an interesting solution: a power supply, switching unit, and battery charger have been combined in one device.

An uninterruptible power supply, or UPS for short, is used wherever mains fluctuations or mains failures may occur. The aim is to prevent the failure of production systems caused by short-term interruptions to the power supply. In the event of prolonged mains failure, the UPS should ensure that a safe system state is entered. In addition, uncontrolled crashes on control systems such as industrial PCs should be avoided in order to prevent data loss and other damage.

Structure of a UPS system
The UPS system for DC loads generally consists of at least three components. First, the existing AC mains voltage is converted into a 24 VDC voltage by a power supply unit. This voltage now needs to be buffered. To do this, a dedicated DC UPS is used which combines two functions: firstly, it acts as a switch that connects to the supply provided by a connected energy storage device in the event of mains failure; secondly, the UPS contains a charge controller that recharges the connected energy storage device during mains operation. The third component is the energy storage device that is connected to the UPS.

Wiring effort and space required
This proven, modular structure presents advantages as well as disadvantages. The biggest drawback is the large amount of space it requires on the DIN rail. For example, a modern 24 VDC power supply unit with 5 A output power has an overall width of around 35 to 50 mm. Then you need to factor in the DC UPS for the same performance class, which has an almost identical overall width. This results in a maximum overall width of almost 100 mm. Then we have the energy storage device, which usually takes up the most space. For example, to buffer 5 A for around 20 minutes, an energy storage device with a nominal capacity of 3.4 Ah for 24 VDC is required. This has an overall width of approximately 85 mm.

Another aspect that planners need to consider is the selection of suitable power supply unit and UPS combinations. In the example above, a 5 A power supply unit and 5 A UPS were selected. But what does this actually mean? Both the UPS and the power supply unit can deliver a maximum output current of 5 A under operating conditions. So does this mean that a 5 A load can be connected and reliably supplied in both mains and battery operation? The short answer for mains operation is no.

The charging current has not been taken into consideration thus far. The UPS needs this current in addition to the load current in order to recharge the energy storage device. Assuming an additional charging current of 1.5 A, a correspondingly larger power supply unit must be selected. With some sort of reserve, e.g. to compensate for losses in the system, this would require a power supply unit with an output power of 7 A. However, the...
next most common size is usually 10 A. This means that a power supply unit that is twice as powerful has been selected to ensure a load current of about 5 A. This results in higher initial costs and takes up even more space.

However, the modular structure does have advantages. With this option, it is easy to distinguish between critical and non-critical loads. Critical loads must continue to be supplied in the event of mains failure, such as in the case of a controller. Non-critical loads, on the other hand, do not have to be supplied in the event of mains failure. This is why uncrirical consumers are connected directly to the power supply unit output, while the relevant consumers are connected to the UPS output first.

Practical example for an elevator controller
In numerous applications, a complete structure such as a control cabinet needs to be supplied. This is where the problem of limited space really becomes apparent. One example for the use of a UPS is the supply of an elevator controller. Here, in the event of mains failure, the operator or even the emergency services must be notified by means of remote signalling. The power consumption of the required consumers is a maximum of 4 A, and the required buffer time exceeds 5 minutes. Furthermore, special normative requirements also apply to these types of applications – the connected energy storage device must be actively monitored, for example.

For these types of application, Phoenix Contact offers a practical solution in the form of second generation Trio Power uninterruptible power supplies. Combining a power supply unit with wide-range input and integrated UPS, the devices are particularly suitable for applications where space is limited and all connected loads need to be buffered.

In the elevator application, an output current of 4 A is required. The ideal solution here is the Trio Power UPS with 5 A nominal output, which has a 20% reserve to support extension. With an overall width of just 60 mm, the compact device also provides a maximum charging current of 1,5 A internally, in addition to the load current. The user can therefore be confident that the 5 A device has sufficient reserves to charge the energy storage device. In addition, they can select the device that best suits the load requirements of their application. No further consideration needs to be given to the charging current.

In order to achieve the required buffer time, an energy storage device with 1,3 Ah simply needs to be connected to the UPS. Active battery monitoring can also be easily implemented using UPS devices from the Trio Power series. They feature an alarm signal contact and an LED indicator, which are activated, for example, if the maximum permissible recharging time has been exceeded and the battery is potentially faulty. In addition to error evaluation via signal contacts, a PC can also be connected via USB. The UPS system can then be conveniently monitored via the UPS-Cong software, which is available free of charge.

Compact devices with useful functions
The new UPS devices from the Trio series showcase their advantages in confined spaces. The combined power supply unit and UPS not only save space, but simplify planning. Despite their compact design, the devices deliver a high level of performance and are tailored to the requirements of numerous fields of application.

For more information contact Sheree Britz,
Phoenix Contact, +27 11 801 8200,
sbritz@phoenixcontact.co.za,
www.phoenixcontact.co.za
According to Zest WEG Group, there are misconceptions around what constitutes ‘earth’ and ‘neutral’ connections, and not understanding the differences can create serious problems when connections are made from onsite transformers or other sources. This more often than not leads to earth leakage systems underperforming and compromising the safety of the equipment and operators.

Johan Breytenbach, transformer sales specialist at Zest WEG Group, says that the neutral connection in an electrical installation is designed to carry current all the time, while the earth connection is only supposed to carry current for a short period to trip the protection switch. Experience has shown that many farmers use the neutral connection as the earth when they do an electrical installation, which is not correct. Current carried on a grounding conductor can result in significant or even dangerous voltages on equipment enclosures. For this reason, the installation of grounding conductors and neutral conductors is carefully defined in electrical regulations.

In alternating current (AC) electrical wiring, the earth is a conductor that provides a low impedance path to earth so that hazardous voltages do not find their way to the equipment. Under normal conditions, the earth connection does not carry any current. Neutral, on the other hand, is a circuit conductor that normally carries current back to the source. Neutral is usually connected to earth at the main electrical panel or meter, and also at the final step-down transformer of the supply. Neutral is also the connection point in a three-phase circuit, neutral is usually shared between all three phases, with the system neutral being connected to the star point on the feeding transformer.

Earthing is therefore a vital part of electrical installations to ensure that circuit breakers will trip under fault conditions. Safe and legal installation needs to start with the selection of the right transformer, with a star configuration to allow the connection to the neutral point. Installation by a qualified and experienced technician is then ideal, to ensure optimal performance.

The correct earthing or grounding of electrical currents has a number of important benefits apart from the main concern around safety. It protects equipment and appliances from surges in electricity – commonly from lightning strikes or power surges – which bring dangerously high voltages of electricity into the system. Good earthing will ensure that excess electricity will go into the earth, rather than damaging equipment.

For more information contact Zest WEG Group Africa, +27 11 723 6000, info@zestweg.com, www.zestweg.com

For more information contact Ryan Burger, HellermannTyton, +27 11 879 6600, jhb.sales@hellermann.co.za, www.hellermannytton.co.za
Medium Voltage Switchgear
Designed for standard applications in the power utility and industrial sectors

Safe, Productive, Flexible

The highest standards of operator safety and increased productivity is offered. The switchgear uses a vacuum circuit breaker, an exceedingly proven and widely used technology within the industrial and reticulation sectors.

The standard instrument transformers and open communication protocol relays ensure flexibility of customer’s programmes.

Save on Cost and Time

Easy access to cables and busbars creates a short installation time and less installation costs.

Highly Compliant

Based on the latest IEC specifications, IEC 62271-200 and complies with verifications tests as specified by this standard.

Manufactured locally for prompt production and flexible lead times.

Contact our highly qualified sales team.
031 783 4607

www.voltex.co.za
info@voltex.co.za

Proudly Bidvest
MV/LV Solutions
Vert Energy is committed to providing energy-saving solutions for its diverse customer base. “Critical challenges facing industry include finding the most efficient ways to minimise energy consumption and reduce CO2 emissions, with no compromise on productivity and safety,” says managing director, Grant Robertson. “With the implementation of variable speed and the optimisation of mechanical speed reduction efficiencies, the maximum saving of electricity consumption is obtained in any power transmission system.

“Feedback from our customers indicates that by combining Leroy Somer Dyneo permanent magnet motors with variable speed technologies, they have not only significantly reduced energy consumption, but also enjoy a good return on investment and lower overall cost of ownership. “Through Dyneo permanent magnet solutions, with sensorless control and interchangeability with standard IEC mechanisms, we are able to offer our customers the benefits of high-performance permanent magnet motors, with the simplicity of mounting and installation equivalent to traditional asynchronous motors.”

The Dyneo range includes the option of an aluminium frame in sizes up to 500 kW. Benefits include European quality standards with certified efficiency ratings from approved regulatory bodies, an improved aesthetic finish as opposed to a rugged cast-iron body, removable feet for multi-mounted applications in certain frame sizes, better heat dissipation than with traditional cast-iron frames, and fewer losses due to improved thermal characteristics.

Leroy Somer’s Dyneo permanent magnet solutions enable the construction of lighter units with a reduced footprint, which is particularly beneficial to OEMs. The compact design and fewer mechanical components mean reduced size of the chassis. This design also facilitates easy installation of the motor, simplification of lifting and reduced transport costs.

**Drive technology**

The Dyneo drive units ensure high efficiency levels over the whole operating range, especially at speeds below the synchronous speed, where efficiency is higher than with asynchronous motors. Dyneo technology, which also guarantees optimum torque over wide speed ranges without derating or forced ventilation, significantly improves the drive’s efficiency and enhances specific output power, offering better performance than conventional technologies.

Other important features include adaptation of the motor speed to the speed of the driven machine, improved performance of the driven machine by increasing its speed, potential elimination of gearing, a low rotor temperature-rise and better bearing performance.

**Permanent magnet motors**

LSRPM (IP55)/PLSRPM (IP23) permanent magnet motors are built using the same high quality European mechanical components as Leroy Somer asynchronous motors, to offer reliability and flexibility. This interchangeable range, with standard dimensions in terms of frame size, flange and shaft extension, provides an immediate energy-efficient solution without the need for modification of the existing system.

Advantages of the design include less wiring and fewer connections for simplicity of installation. Encoders or long cable lengths are not required and there is no need for concern about environmental constraints, like vibration, temperature and abrasive dust, affecting the machine.

These high-performance variable speed solutions, designed for applications requiring high torque at high speed, enhance power transmission performance in pumping, ventilation, compression, conveying, extrusion, process control and generator applications.

In a recent project, a variable-speed screw compressor, equipped with a Dyneo permanent magnet solution, was added to the existing four fixed-speed screw compressors used in refrigeration during beer production. This upgrade has achieved energy savings of 600 000 kWh/yr, as well as an increase in the maximum speed and improved system performance.

Another successful installation formed part of a modernisation programme at a rubber extrusion facility, where Vert Energy’s Dyneo solution has eliminated the machine’s off-centre pulley and belt system. The motor can withstand operation in 50°C above ambient temperature, and because of its compact design, it could be installed under the screw.

Vert Energy’s service to the electro-mechanical power transmission sector encompasses the supply of dependable products that combine high performance, energy efficiency, reduced downtime and extended service life, to meet stringent quality, safety and environmental standards.

For more information contact Ryan Robertson, Vert Energy, 086 111 8378, ryan.robertson@vertgroup.co.za, www.vertgroup.co.za
RS Components introduces new Power over Ethernet injectors

RS Components has announced availability of a new selection of Power over Ethernet (PoE) single-port mid-span power injectors manufactured by Phihong, a leader in advanced power solutions and a specialist in PoE technology.

Designed to deliver increased flexibility, PoE technology integrates power and data over an Ethernet cable. By integrating power into a standard LAN infrastructure, the technology can enable highly scalable and flexible networking, enabling the placement of powered network devices where they are needed and not necessarily near a power source. PoE technology targets an extensive series of applications and enables power to be supplied to devices such as IP telephones, security cameras, IP print servers and wireless LAN access points including Bluetooth and WiMax.

Midspan power injectors deliver additional power capability and can be used in combination with either a non-PoE switch or a PoE switch already in place in a network that is potentially operating at full capacity. Midspan solutions can cost substantially less than a new PoE-enabled switch, and come in single or multi-port options.

Offering a wide selection of power ratings from 15.4-60 W, the Phihong PoE midspan power injectors also feature: compliance with either IEEE802.3AF, AT or BT, depending on the selected model; Gigabit Ethernet compatibility; universal input from 90-264 VAC and protection features including over current and over voltage.

BMG enhances efficiency of solar tracking system

BMG has extended the supply of Varvel gearboxes for small and medium power applications to include customised worm gearboxes for installation in photovoltaic solar tracking systems.

“As part of BMG’s commitment to providing alternative energy sources, the company works in conjunction with Varvel specialists and South African PV component manufacturers to design sustainable solutions for local conditions,” says Kelly Mac Iver, gears business unit manager, BMG. “Through close collaboration, BMG, Varvel and South African solar tracking manufacturers, PIA Solar SA, have redesigned mechanical drive components for solar tracking systems, to enhance cost-efficiency, increase installation speed and optimise the performance of every PV tracking installation.

“Customised Varvel worm gearboxes – designed to minimise losses associated with the energy conversion process – are incorporated in PIA Solar’s ContouR+ single-axis trackers. These maintenance-free gearboxes maximise efficiency by ensuring solar panels are always in the optimal position to track the sun.”

The PIA Solar tracker solution consists of a horizontal single-axis tracker that is capable of contour tracking the sun, both along and between rows of solar panels (up to 60 modules per row and 32 rows wide). The modular design requires no cutting, drilling or welding on-site and forms a mass-balanced system, reducing wear and self-consumption of the PV plant. The spring structure eliminates deviations in tilt within the rows, reduces peak power requirements of the electrical push-pull drive system, and also protects against oscillation of the system at low tilts.

BMG’s lightweight Varvel worm gearboxes are installed on solar panels to ensure that they are constantly in an optimal position to be able to track the sun. Versatile Varvel RT worm gearboxes have numerous advantages for PV installations, including an ingress protection rating of IP66. Other significant features include a high ratio of 1120:1 and the non-back driveability design for locking the solar panels in place, to resist external forces from moving the panels off their stopped position.

The Varvel range, which is designed for flexibility and interchangeability with other leading gearboxes, as well as easy mounting and quick lead times, enables BMG to offer customised power transmission solutions to users of gearboxes in diverse sectors.

For more information contact Lauren Holloway, BMG, +27 11 620 7597, laurenhy@bmgworld.net, www.bmgworld.net

For more information contact RS Components SA, +27 11 691 9300, sales.za@rs-components.com, www.rsonline.co.za
Wireless networks for AGV systems

In order for factories to perform their tasks efficiently and optimise production, automated material handling (AMH) systems, such as AS/RS and AGVs, need the flexibility to move around on their designated paths without obstruction, while maintaining constant communication with the control centre through a wireless network. Additionally, the control centre needs a reliable wireless network to monitor and control the AS/RS and AGV systems, as well as sufficient bandwidth to send data and instructions and receive data without delay, including live video recordings from the IP cameras installed in these systems.

Deploying a wireless network on a factory floor or in an automated warehouse is not an easy task and requires in-depth RF domain knowhow, and also some IT knowledge. However, understanding basic wireless principles and key challenges can go a long way in determining the success of the implementation. RJ Connect and Moxa are committed to providing easy to use and deploy radio equipment to help build efficient wireless networks for AS/RS and AGV systems.

For more information contact RJ Connect, +27 11 781 0777, info@rjconnect.co.za, www.rjconnect.co.za

Merging control and telemetry

Wireless telemetry and control in plants have become a necessity with the data acquisition requirement of modern plant control to lift performance and compliance. In-plant cabling costs often push the economic viability of peripheral plant data acquisition and control systems projects into the pending list of plant capex. The benefit of having the data and control is undeniable, but often too expensive to implement. Wireless control and automation provide a cost-effective solution and the technology is improving all the time.

Licence free wireless bands are extremely attractive for cable saving in the plant. Distances of up to 20 km are not uncommon, even with these low power transceivers. Omniflex Teleterm offers a range of compliant frequency band options to suit the global market. Omniflex has employed various methods of optimising their licence-free band wireless devices for maximum efficiency in a one unit fits all package. Other features include:
• Full standalone controller with optional IEC61131 programming in five languages.
• Optimised highly efficient radio communication.
• Mixed I/O for small systems.
• Standard Modbus protocol.
• Standard RS-485 and Ethernet ports.
• Powered from 9 to 30 VDC.
• Standby battery options.
• Solar power options.
• Easy to connect to DCS or scada. Applications include remote pump control, pump rotation control and condition monitoring, remote effluent plants with analytical instrumentation, dosing stations, environmental monitoring, water quality, remote flow monitoring and custody transfer systems.

For more information contact Ian Loudon, Omniflex, +27 31 207 7466, sales@omniflex.com, www.omniflex.com
Managing complexity in wireless environments

In the decades since its infancy, wireless networking has undergone tremendous shifts, opening an avenue for enterprise wireless Internet consumption. The advances in speed, coupled with the sheer convenience of Wi-Fi for consumers who can work remotely, from any device, and wherever there is a connection, has caused adoption to snowball. However, as an increasing number of users connect more tablets, laptops, smartphones, sports trackers, and IoT devices to any particular wireless network, complexity grows and the possibility of performance deterioration gets higher.

So says Adeshni Rohit, business unit manager for Cisco at Axiz, adding that access point performance can degrade under crushing client loads, and adding more access points for additional capacity is not always a workable solution as it can initiate co-channel interference, which negatively affects performance. Multiple connections also mean multiple points of failure, particularly as there are a few steps each device needs to take to associate and pass traffic on a network. And any one of these can go wrong for a variety of reasons. “In this way, a causal nexus of greater client load, interference, and points of failure can develop if administrators are not able to quickly pinpoint the root causes of Wi-Fi issues,” she adds.

Consumers demand more

Alongside the growing complexity of wireless networks, guaranteeing a good end user experience is vital for enterprises which are looking to stay ahead of their competitors. “Taking into account the exponential growth in the demand for wireless, the burden on legacy infrastructure that was designed with coverage not capacity in mind is blatantly clear”, says Rohit. “Without a carrier-class wireless network that can cope with client load, and support the latest use cases for location-based client analytics and insights, business outcomes can be negatively impacted.”

Enterprises around the globe have moved from wired to wireless throughout their spaces, due to the cost effectiveness and efficiency wireless offers, and its convenience in terms of collaboration. The bottom line is that the need for strong, reliable wireless networks for business-critical functions cannot be emphasised enough, even though they are becoming increasingly complex to manage and maintain.

Cisco Meraki

“This is why Axiz uses Cisco Meraki to help its partners with their wireless needs,” explains Rohit. “Meraki enables next-generation wireless and wired networks that are managed over the Web, offering out-of-the-box management, security, and capacity, but without the expense and complexity brought by traditional networking infrastructure. This technology can help organisations of every type address a variety of modern network issues from bring your own device to content management.”

Meraki brings a unique and effective approach to wireless, shifting the complexity of the network from the infrastructure to the cloud, providing many benefits, including the ability to manage access points from a browser based dashboard, as well as no expensive controller hardware to buy, and no software to install. It offers reliable coverage and high performance, as well as secure access for employees, guests and devices. Finally, its Layer 7 visibility, gives businesses the ability to view and manage application usage.

For more information contact Evette Wessels, Axiz, +27 11 237 7000, evette.wessels@axiz.com, www.axiz.com

WIRELESS
CONTROL, DATA ACQUISITION and MONITORING
“All in a single easy-to-use package”

THE TELETERM SERIES

HMI’s
TOUCH SCREEN GRAPHIC INTERFACES
“Up and running in no time”

THE EASYVIEW GRAPHIC HMI SERIES

REMOTE MONITORING SPECIALISTS
www.omniflex.com
Tel: +27 31 207 7466, Fax: +27 31 208 2058, sales@omniflex.com

www.instrumentation.co.za June 2019 61
Cost-efficient production with 18 synchronous NC axes

TwinCAT 3 controls highly efficient machine for processing of die-cast automotive parts.

Swedish equipment manufacturer Ecme AB has developed a high-tech machine for a supplier to the automobile industry that can complete several process steps simultaneously without having to remount the part being worked. The machining centre is designed for high-volume production of up to 200 000 parts per year and performs its functions and processing steps simultaneously within the same cycle. The machine reduces the previous processing and conversion times by more than one third, while requiring less of the valuable shop floor space with its reduced footprint. Beckhoff supplied TwinCAT 3 automation software for the Ecme machine’s PLC and NC operations as well as the main spindle and forward-feed drives.

Founded in 1983 and located in the Swedish city of Växjö, Ecme AB produces hydraulic and mechanical fixtures, accessories for robot grippers and customised machines for assembly, part handling and machining operations. The latest example is the newly developed Ecme SPM (special purpose machine) machining centre, which integrates and simultaneously executes all steps for processing up to 200 000 pressure die castings per year for the automotive industry.

From the drawing board to the finished machine in record time

When equipment manufacturers design a customer-specific machine, they must keep an eye not only on component costs but also on development expenses. For this reason, the time from first draft to delivery should be as short as possible. “Since we don’t build a machine of this magnitude every day, we looked for a partner who could supply control and drive components designed to meet customer requirements,” says Daniel Eklund, managing director of Ecme.

The challenges were considerable. Parts that were previously made on two machine tools with three to five axes had to be processed by a single machine operating 18 NC axes simultaneously. Two main spindles are designed as four-axis units, meaning they can move freely along the X, Y and Z axes as well as rotate and tilt. Another
At a glance:
Solutions for machine tools
• Production of die-cast automotive parts
Costumer benefits
• About one third less processing and conversion times.
• Reduced machine footprint.
Applied PC control
• C6930: ample performance for simultaneous control of 18 axes.
• TwinCAT 3 NC I: easy to handle NC modules.
• AX5000, AM8000: fast, dynamic and with OCT also space-saving drive solution.

three main spindles move as three-axis units supplemented by an additional one-axis main spindle. With this configuration, workpieces can be machined on all sides without having to be remounted. A tool changer with four different tools makes the design even more flexible.

“The Ecmec SPM employs a totally different set of processing methods compared to traditional machines and does everything much faster,” explains Eklund. “It processes the workpieces roughly 33% faster than conventional machines and requires less machine footprint.”

Precise motion control with faster response times

“Addressing all 18 axes simultaneously requires a fast and powerful control system which is where Beckhoff came into play,” says Eklund. “To avoid interface problems, we looked for a solution from a single source, and Beckhoff was able to meet all the customer specifications.”

The flexible hardware design was another reason for the decision to select Beckhoff technology, because it made a big difference for the project group. “We ran through various alternatives, but the NC I software modules from Beckhoff represented the best option. The Beckhoff system is very powerful and easy to operate, which is something we truly appreciate. It is a prime example of German engineering,” adds Eklund.

At the core of the machine is TwinCAT 3 NC I software, which controls the six mechanical spindles simultaneously. The numbers of axes and channels were adjusted to satisfy the application’s requirements with respective option packages. As a highly scalable system, PC-based control also provides the best possible hardware platform for this application. The TwinCAT real-time kernel and the ultra-fast system communication over EtherCAT offer ideal conditions for high-precision motion control. Eklund explains: “This platform provided very fast control properties and a much faster response time than the conventional PLCs we used in the past, which was one of the main reasons why we selected PC-based control technology from Beckhoff.”

In addition, the TwinCAT development environment provides numerous features that make the designer’s work easier. For example, Ecmec’s programmers developed their own control and machine software on the basis of TwinCAT 3. They also opted to use the syntax with G and M-codes as defined in the DIN 66025 standard, which makes it easier for the machine operators to change setups for new workpieces. These and other features enabled Ecmec to develop this high-performance machine in a very short timeframe.

Control and drive components from a single source

The Ecmec SPM is controlled and operated via a C6930 control cabinet Industrial PC with a custom-designed CP3921 multi-touch control panel featuring pushbutton extensions. The user interface is TwinCAT HMI for NC processing, which is easily programmable based on standards such as .NET. The axes and I/O channels are configured via TwinCAT Engineering with NC I functions.

The two main spindles are equipped with AM8000-series servomotors with speeds of up to 11 000 rpm. The other four spindles ensure a high degree of processing efficiency for downstream processing steps as well. The maximum feed rate is 30 m/min, and the maximum acceleration rate is 0,2 g. The six main spindles and 12 servomotors are controlled by Beckhoff AX5000 servo drives for exceptionally fast and dynamic positioning. In addition, One Cable Technology (OCT) saves a significant amount of installation space.

To protect the operators and avoid equipment collisions, all servo drives are equipped with AX5805 TwinSAFE cards. The machine also uses TwinSAFE terminals and the EL6900 TwinSAFE Logic terminal with certified safety function modules and Safety over EtherCAT (FSoE).

For more information contact
Michelle Murphy, Beckhoff Automation,
+27 11 795 2898,
michellem@beckhoff.com,
www.beckhoff.co.za
Part localiser from SICK Automation

Testing and assembly specialist, Kubik Automation from Baienfurt, Germany, is putting SICK Automation’s PLOC2D robot guidance system to use in its new sCube assembly cell. The team of experienced industry experts specialises in the development of innovative products and the optimisation of production processes for automation technologies. Tailor-made special machines are developed for the automotive, electro-mechanics, medical technology, and consumer goods sectors. From the perspective of manufacturers, the requirements placed on the flexibility of automation solutions are increasing. With the sCube, several different parts can be handled by a single machine without having to change the entire production process.

Anyfeeders are ideal for applications involving different parts where products are changed frequently. They convey and flip small parts without refeeding and without the use of conveyor belts. An anyfeeder is generally made up of three components which work together: an intelligent vibration unit combined with a magazine, which separates small parts and realigns them; a vision system, which localises the parts; and a robot, which picks up the parts and moves them on.

Teamwork of components is successful

The work sequence follows the interaction of the three components described. The PLOC2D robot guidance system from SICK quickly and reliably detects the position of all parts and transmits position data and orientations to the robot control system. Using this information, the robot is able to pick the correctly aligned parts and feed them to the next process. Any parts that are not properly aligned are ignored.

Once the properly aligned parts have been removed, the remaining components in the pick zone are mixed up again by a pulsed vertical oscillation from the vibration unit. The PLOC2D is a vision system for two-dimensional part localisation. It consists of high-quality image processing hardware and is equipped with an extremely high-performance localisation algorithm for reliable and fast part localisation. The system particularly impresses thanks to its short setup times. It does not require any programming knowledge and can be put into operation straight away following a simple configuration and parameterisation process via a web browser. Thanks to the EasyTeach method, it can also be tailored to different parts and can be integrated into numerous robot brands and PLCs. In essence, the robot guidance system from SICK brings order to the chaos of part localisation.

For more information contact Prishan Chain, SICK Automation Southern Africa, +27 10 060 0550, prishan.chain@sickautomation.co.za, www.sickautomation.co.za

Interference-free transmission with the Ethernet media converter

The new FL MC EF 660 SCRJ media converter from Phoenix Contact enables the connection of cost-effective polymer and HCS/PCF fibre technology. The optical transmission of data via fibre optics is free of electromagnetic interference and provides complete electrical isolation on the transmission path. It is therefore particularly suitable for Ethernet applications.

Specifically designed for Profinet, the SCRJ connector enables easy assembly without specialist knowledge. The devices, which are transparent with respect to transmission, have a short delay time (latency) of 60 ns – particularly advantageous for time-critical Ethernet protocols. In addition to numerous diagnostic LEDs, the media converters feature the LFPT (link fault pass through) function. This ensures permanent and consistent connection monitoring. If a link is lost, redundancy mechanisms can be activated immediately. Integrated fibre optic diagnostics continuously indicate the receiving power via an LED bar graph. In addition, a broken fibre or the instance when the system reserve is reached can be read via two floating switch outputs.

For more information contact Sheree Britz, Phoenix Contact, +27 11 801 8200, sbritz@phoenixcontact.co.za, www.phoenixcontact.co.za
LTF Series Time of Flight Laser Distance Sensors are designed to accurately measure targets at distances up to 12 meters. They provide reliable detection regardless of colour or material, even at an angle, providing a reliable solution for challenging targets. They solve a broad range of industrial measurement applications, including part-in-place, part profiling and positioning, and roll diameter and web tension control.

Turck Banner (Pty) Ltd
sales@turckbanner.co.za | Phone: +2711 453 2468
Whether it’s grabbing, holding or turning, touching, typing or pressing – in everyday life, we use our hands as a matter of course for the most diverse tasks. In that regard, the human hand, with its unique combination of power, dexterity and fine motor skills, is a true miracle tool of nature. What could be more natural than equipping robots in collaborative workspaces with a gripper modelled after this ‘miracle of nature’, which solves a variety of tasks by learning through artificial intelligence?

Festo’s pneumatic robot hand – BionicSoftHand – combined with the BionicSoftArm, a pneumatic lightweight robot, shows how such futuristic concepts are suitable for human-robot collaboration.

The BionicSoftHand is pneumatically operated so that it can interact safely and directly with people. Unlike the human hand, the BionicSoftHand has no bones. Its fingers consist of flexible bellows structures with air chambers. The bellows are enclosed in the fingers by a special 3D textile coat knitted from both elastic and high-strength threads. With the help of the textile, it is possible to determine exactly where the structure expands and generates power, and where it is prevented from expanding. This makes it light, flexible, adaptable and sensitive, yet capable of exerting strong forces.

Artificial intelligence
The learning methods of machines are comparable to those of humans. Either in a positive or a negative way, they require feedback following their actions in order to classify and learn from them. BionicSoftHand uses the method of reinforcement learning.

This means that instead of imitating a specific action, the hand is merely given a goal. It uses the trial and error method to achieve it. Based on feedback, it gradually optimises its actions until the task is finally solved successfully.

Specifically, the BionicSoftHand should rotate a 12-sided cube so that a previously defined side points upwards at the end. The necessary movement strategy is taught in a virtual environment with the aid of a digital twin, which is created with the help of data from a depth-sensing camera via computer vision and the algorithms of artificial intelligence.

Proportional piezo valves for precise control
In order to keep the effort of tubing the BionicSoftHand as low as possible, the developers have specially designed a small, digitally controlled valve terminal, which is mounted directly on the hand. This means that the tubes for controlling the gripper fingers do not have to be pulled through the entire robot arm. The BionicSoftHand can be quickly and easily connected and operated with only one tube each for supply air and exhaust air. With the proportional piezo valves used, the movements of the fingers can be precisely controlled.

BionicSoftArm: one robot arm, many possible variations
The strict separation between the manual work of the factory worker and the automated actions of the robot is increasingly being set aside. Their work ranges are overlapping and merging into a collaborative working space. In this way, human and machine will be able to work together simultaneously on the same workpiece or component in the future, without having to be shielded from each other for safety reasons.

The BionicSoftArm is a compact further development of Festo’s BionicMotionRobot, whose range of applications has been significantly expanded. This is made possible by its modular design. It can be combined with up to seven pneumatic bellows segments and rotary drives. This guarantees maximum flexibility in terms of reach and mobility, thus enables it to work around obstacles even in the tightest of spaces if necessary. At the same time, it is completely flexible and can work safely with people. Direct human-robot collaboration is possible with the BionicSoftArm, as well as its use in classic applications, such as pick-and-place tasks.

Flexible application possibilities
The modular robot arm can be used for a wide variety of applications, depending on the design and mounted gripper. Thanks to its flexible kinematics, the BionicSoftArm can interact directly and safely with humans. At the same time, kinematics makes it easier for it to adapt to different tasks at various locations in a production environment. The elimination of costly safety devices such as cages and light barriers shortens conversion times and thus enables flexible use, completely in accordance with adaptive and economical production.

For more information contact
Kershia Beharie, Festo, +27 11 971 5509, kershia.behari@festo.com, www.festo.co.za
Beckhoff now offers a machine learning (ML) solution that is seamlessly integrated into TwinCAT 3 software. Building on established standards, TwinCAT 3 Machine Learning brings to ML applications the advantages of system openness from PC-based control. In addition, the TwinCAT solution supports machine learning in real-time, allowing it to handle even demanding tasks like motion control. These capabilities provide machine builders and manufacturers with an optimum foundation to enhance machine performance, e.g. through prescriptive maintenance, process self-optimisation and autonomous detection of process anomalies.

The fundamental concept of machine learning is not to follow the classic engineering route of designing solutions for specific tasks and then turning these into algorithms, but to learn the desired algorithms from process data instead. With this alternative approach, powerful ML models can be trained and then used to deliver superior solutions. In automation technology, this opens up new possibilities and optimisation potential in many areas, including predictive maintenance and process control, anomaly detection, collaborative robotics, automated quality control and machine optimisation.

The models to be learned are trained in an ML framework, such as MATLAB or TensorFlow, and then imported into the TwinCAT runtime via the Open Neural Network Exchange Format (ONNX), a standardised data exchange format used to describe trained models. The TwinCAT runtime incorporates the following new functions for this purpose:

- TwinCAT 3 Machine Learning Inference Engine for classic ML algorithms, such as support vector machine (SVM) and principal component analysis (PCA).
- TwinCAT 3 Neural Network Inference Engine for deep learning and neural networks, such as multilayer perceptrons (MLPs) and convolutional neural networks (CNNs).

**Model results are directly executable in real-time**

Inference i.e. the execution of a trained ML model, can be performed directly in real-time with a TwinCAT TcCOM object. With smaller networks, system response times of less than 100 μs corresponding to a TwinCAT cycle time of 50 μs are supported. Models can be called via PLC, C/C++ TcCOM interfaces or a cyclical task.

Through seamless integration with the control technology, the multi-core support provided by TwinCAT 3 is also available for machine learning applications. This means, for instance, that different task contexts can access a particular TwinCAT 3 Inference Engine without restricting each other. All the fieldbus interfaces and data available in TwinCAT can be fully accessed as well. This allows ML solutions to use immense amounts of data, for example, for complex sensor data fusion (data merging), and it also means that real-time interfaces to actuators are available to enable, among other things, optimal control.

For more information contact
Michelle Murphy, Beckhoff Automation,
+27 11 795 2898, michellem@beckhoff.com, www.beckhoff.co.za
Control loop question answered

Michael Brown is a specialist in control loop optimisation with many years of experience in process control instrumentation. His main activities are consulting, and teaching practical control loop analysis and optimisation. He gives training courses which can be held in clients’ plants, where students can have the added benefit of practising on live loops. His work takes him to plants all over South Africa and also to other countries. He can be contacted at Michael Brown Control Engineering cc, +27 82 440 7790, michael.brown@mweb.co.za, www.controlloop.co.za

Control loop expert Michael Brown recently received a question from reader, Hansell Williams. The question relates to applying neural network and machine learning concepts to plant automation and control. Due to its topical nature, we decided to publish it along with Michael’s detailed answer.

Hansell’s question
As you would be aware, neural networks (NN) and machine learning (ML) are both topical subjects in the field of automation. Having been fascinated by NNs since the ‘90s, I wondered what your take would be on applying them to plant control. Does it even have a place? Regarding the modelling side of things: I recently read a paper on how NNs could be used to discover underlying models of systems, which could have some value.

In the early 2000s De Beers had an innovative research project that used a NN to substitute for the non-availability of an expensive instrument like a weightometer. The NN could be trained on scada history collected over years, which would make it a pretty reasonable predictor of a wide range of situations – good or bad. Adding a few of these around the plant could be an interesting way of putting to good use the millions of time-tagged data points accumulated over years.

Is it possible that historical process data could be fed into the NN to predict PVs or macro outcomes to degrees not possible through classical methods?

Michael’s reply
To address your query: My speciality is in the field of base layer feedback control and I know very little about APC systems like NNs, and have no practical experience of them. However, I know that on certain occasions they can, and do, play an important part in improving process control – sometimes dramatically.

It is quite possible that your suggestion of using process data history to predict outcomes could be of use in certain situations, similar to weather predictions that use masses of past data. However, on the individual loop basis, one must remember that the dynamics of most processes do change with time. I have heard people suggesting that the ‘half-life’ of a well-tuned loop is about 16 months. This sort of information can only be given by people who do optimisation and really understand what they are doing, and who work in the same plant for years. I have only worked regularly in one particular plant, a petrochemical refinery that I visit for one or two weeks every year. In this plant I have found that the dynamics in certain loops change dramatically from one year to the next. I am not sure if this is due to different operating conditions, as the processes are complex, but even the process specialists themselves generally cannot explain the causes. This is one of the many reasons that model based tuning does not work satisfactorily, particularly on complex dynamics.

There is a question that is often posed to me which is relevant to this discussion: “Why are we still using PID control in the modern world? It is a technology that is a century old!”

One reply to this was given at a talk presented many years ago by the renowned Greg Shinskey, at which I was fortunate enough to be present. He was asked the question by a leading academic expert on fuzzy logic. His reply was simple: “It is the only technology in control that can deal with unmeasured upsets without resorting to complex programming for that particular process.”

I always tell delegates on my courses to remember that feedback control is an innate part of life for all sentient living creatures. Virtually all of them use feedback control to move around and perform tasks. However, when human beings started trying to install feedback control systems in machines and processes in the early 20th century, they found it extremely difficult, and it took some of the world’s leading mathematicians to define how it works. This is the reason that few people really understand the technology, as the theory is mathematically intensive and unfortunately there has been a dearth in teaching the ‘practicalities’ of feedback control, which can make it much easier to understand. As mentioned in my articles, over 85% of control loops worldwide are not operating efficiently in automatic. However, once properly set-up, feedback control loops can work unbelievably well.

At this stage in our technology evolution, it is hard to imagine anything that can replace it, mainly as it deals so well with immeasurable upsets. It is for this reason that nearly all APC systems require ‘base layer’ feedback control systems below them, in order to ensure that the processes do in fact get to the setpoints as dictated by the advanced systems.

In conclusion, I think your proposal might well have some merit, and for all I know, may already be used in some APC systems. However, it would not replace, and would still have to use, the feedback base layer below it.

All reader’s with control loop related questions are invited to submit them to Michael Brown, Michael Brown Control Engineering cc, +27 82 440 7790, michael.brown@mweb.co.za, www.controlloop.co.za
outdoorScan3: MOVING BEYOND LIMITS

Intralogistics processes beyond the boundaries of production halls clear the path to the Smart Factory of the future. Stepping outside is now becoming reality for humans and machines. The outdoorScan3 can open doors for you. You can rely on that. Why? Many pilot customers have tested the outdoorScan3 under real conditions. The result: The world’s first safety laser scanner for outdoor use that is certified according to IEC 62998. We think that’s intelligent. [www.sick.com/outdoorscan3](http://www.sick.com/outdoorscan3)
Schneider Electric announces a new era of control

Schneider Electric’s new high-end Modicon MS80 Ethernet programmable automation controller (ePAC) features redundant processors, native Ethernet, and cybersecurity embedded into its core. It combines native Ethernet capabilities, high performance, high availability for processors and networks, improved industrial cybersecurity, greater flexibility in design and improved agility for operations. Fitted with sensors and Internet connectivity, these devices can communicate and interact with each other over the Web, and can be remotely controlled and monitored.

The IIoT refers to the billions of industrial devices connected to wireless networks gathering and sharing data. The introduction of inexpensive sensors and high-bandwidth wireless networks means that even the tiniest devices can now be connected and provided the intelligence that enables them to be monitored and tracked, sharing data and communicating with other devices. This mountain of data can then be analysed and acted on in real-time to make better informed process decisions. As advances in technology make it more cost-effective to deploy the IIoT, industries will need to acquire a strategic approach to integrating new sensor data with pre-existing data environments. The competitive advantage this data can bring means industrial organisations are looking for ways to integrate controls, automation and data analytics visualisation software, to gain competitive operational benefits.

EcoStruxure for converged solutions

With this in mind, Schneider Electric has spent decades developing solutions to help manufacturing organisations reap the benefits from their systems and harness the power of the Internet. Firstly, the company’s EcoStruxure empowers customers to implement scalable and converged IT/OT solutions to deliver innovation at every level. This interoperable technology platform unites energy, automation and software, ensuring that end-users enjoy enhanced value around safety, reliability, efficiency, sustainability and connectivity.

“The company’s commitment to innovation around digitisation over the last twenty years, has also inspired the development of IIoT solutions for edge control such as the Modicon MS80, its flagship controller with Ethernet at its core,” comments Marc Ramsay, VP Industry Business at Schneider Electric.

A platform that optimises open networks, the MS80 ePAC provides industrial plant operators with the power to design, implement and run a process that actively employs the benefits of open networking, helping customers to diagnose and identify the root causes of problems, as well as make informed decisions about plant operations and energy management.

Secure and versatile

With the Achilles Level 2 certification, this controller was built with security, performance, and sustainable evolution in mind. It is the most advanced PAC ever designed by Schneider Electric in terms of industrial cybersecurity and is tested according to Ethernet services and protocols, such as ARP, ICMP, TCP, IP and others. Firmware integrity is checked at every start-up and is compiled and stored in memory, preventing its recompilation by an outsider.

Mark Williams, director of the Plant Solutions Competency Centre at Schneider Electric says: “The MS80 ePAC is leading the next generation of PACs that leverage open and fast Ethernet communications. Powerful performance is a core feature of the ePAC. It delivers high levels of computing power through a multicore processor, allowing high speed connectivity to network devices while enhancing resistance to cybersecurity threats.

In addition, upgrading to the MS80 ePAC requires no additional investment in wiring, software development or training.”

The MS80 is also compatible with the xBus communications of the Modicon M340 and Premium PLC. Users can easily switch between the different controller sizes in the Modicon range without changing their I/O racks and cabling. It has been built for PlantStruxure, a collaborative and integrated automation architecture that brings together the telemetry, PLC/scada, and DCS offerings, with complete lifecycle services to help make operations more efficient and seamless. From initial design to modernisation, PlantStruxure transparently connects the control, operation and enterprise levels of the business.

For more information contact Silindelokuhle Dumakude, Schneider Electric SA,
+27 11 254 6400, sli.dumakude@se.com,
www.se.com/za
SEW-Eurodrive gave visitors to Africa Automation Fair 2019 a foretaste of its Movi-C modular automation system, ready-made for the requirements of Industry 4.0. This represents the next-generation of automation technology from Germany, and will be phased in gradually in South Africa, according to national sales and marketing manager, Norman Maleka. The system consists of a Maxo-RPS, CMP motors, Movi-C Modular, Movi-C Controller, HMI, and Movikit Robotics software.

The system provides an end-to-end automation solution, from planning to commissioning, operation and diagnostics software, electronic control and monitoring devices, mechanical drives, and gearmotors. What's more, it features open communications topology from Profibus and industrial Ethernet to Modbus.

While the Movidrive B drive inverter and Moviaxis servo inverter have been available for some time, the Movi-C modular automation system sets SEW-Eurodrive on a path to embrace Industry 4.0. “This requires products that are both open and flexible,” stressed Maleka. “Our focus is to provide customers with a fully modular and customisable solution.”

The unit on display was a high-speed pick-and-place solution, including a tracking function, applicable to a range of industries. It was showcased as a ‘teaser’ of what customers can expect in the near future from SEW-Eurodrive, which is already developing new technologies in response to both industry trends and customer requirements.

“Our main focus at the exhibition was energy efficiency,” noted Maleka. Three segment conveyors featured IE2, IE3 and IE4 motors, with the different energy consumptions displayed on a screen. Apart from the motor range, the Movigear mechatronic drive system was also showcased. This technology is making inroads into the food and beverage industry due to its ease of use and quick installation, and the fact that it is easy to clean and meets strict hygiene standards, for which an optional smooth surface is available.

Other products on display included VSDs and the LTP-B Eco HVAC drive, which is ideal for applications in large buildings, hospitals and even mills. Features include an advanced ‘sleep’ and ‘wake’ function that maximises energy efficiency by only switching on a pump, for example, when it is required.

For more information contact Jana Klut, SEW-Eurodrive, +27 11 248 7000, jklut@sew.co.za, www.sew-eurodrive.co.za
The use of functionally safe devices has increased sharply in recent years. In 2017 alone, the number of PROFIsafe nodes brought to market grew by nearly two million. Today, well over 10 million nodes are integrated in production plants. There is hardly a machine or system today that does not make use of safety functions. Another trend is the distribution of demanding automation tasks over multiple controllers that communicate with one another using OPC UA. There are, for example, industries in which there is traditionally a heterogeneous automation landscape, in which controllers from different vendors are often used. However, there is no cross-manufacturer standard for the functionally safe transfer between controllers – and, thus, between machines represented by these controllers.

Another problem with existing safety protocols is the lack of a concept for dynamically establishing and terminating connections. The current state of technology requires that early during the project planning phase, the ‘who communicates with whom’ be defined and those corresponding safe addresses be permanently encoded. Should the communication patterns change or expand, the safety function of all participants must be changed, which usually requires costly recertification.

In the context of Industry 4.0, this is no longer in keeping with the times. It should be possible to rearrange modular machines, e.g., consisting of processing machines, loading and unloading systems as well as other incoming and outgoing transport units, during running operation if necessary, without interrupting production for an unnecessarily long time. If there are safety functions that span over multiple modules, they must be available immediately after rearranging the modules, and, if necessary, generate automatic self-test and user acknowledgements. Cumbersome manual testing of the safety function, or even re-approval by an external agency, is not ideal in these scenarios. There are even more extreme requirements in autonomous mobile vehicles, crane trolleys or robots that move autonomously from machine to machine. Reconfiguration of the safety function must be possible here without any human interaction.

To facilitate such scenarios, a safety protocol between controllers from various manufacturers is necessary that allows connections to be established and terminated dynamically and yet simultaneously supports all concepts that correspond to the current state of technology.

Proven technology for safe concepts

One solution to the problem is offered by the Safety over OPC UA specification, which is currently in review. Since OPC UA is becoming increasingly important for connections between controllers from different manufacturers, it makes sense to extend it to functionally safe communication, as well. For this purpose, the joint working group between PI and the OPC Foundation was started in November 2017. The experts defined the key points for functional safety and the boundary conditions: The safety concept is available to all members of the OPC Foundation and PI. It is compliant with IEC61784-3 and uses existing PROFIsafe mechanisms.

Thus, the following still applies: a single cable for standard as well as safety-related communication. And it will again be based on the proven black-channel principle. This can also be applied to controller-controller communication, whereby the OPC UA communication stack then performs the role of the black-channel. The proven protocol safety mechanisms – CRC, codenames, monitoring numbers, watchdog monitoring and the SIL monitor – will also be adopted.

The OPC UA stack and the network components, such as gateways or routers, do not need to be taken into consideration during a certification and can also be subsequently adapted or expanded at any time. Relevant to certification is only the correctness of the implementation of the PROFIsafe protocol on a functionally safe platform.

More flexibility

In the review version, the fundamental concept and detailed development of the specifications were defined. The new specification first addresses the client/server communication models of OPC UA. A connection to Pub/Sub, including Pub/Sub via TSN, is already provided for, thereby allowing even very short cycle times to be realised in the communication.
Unidirectional, bidirectional and multicast connections are possible, as are arbitrary network topologies e.g. line, tree, star and ring. With up to 1500 bytes, there are also sufficient reserves with respect to the data quantities.

Adjustments were necessary in the state machines, the protocol datagrams and the initialisation, since controllers with equal rights now communicate with each other, rather than a controller communicating with subordinate devices. Clarified in the definition of the state machine of the PROFIsafe protocol are, for example, how a connection is established, when process values or safe substitute values are to be output or how a restart is to be acknowledged. Another aspect is the definition of the data types and data structures that are to be transferred as well as the safe testing to determine whether both communication partners even have the same understanding of how the transferred data are to be interpreted.

Also new are the simplified diagnostics. Particularly with complex safety functions in which multiple controllers from various manufacturers are involved, it is important to quickly identify and localise errors and determine the cause. The specification therefore also defines the diagnostic data that are to be displayed to ensure that the same error text is displayed for each error type (e.g., CRC error or time-out) for all controllers. Diagnostics are possible via the already existing mechanisms of the individual manufacturers as well as via OPC UA, which speeds up the localisation and identification of possible error sources.

**Changing communication partners**
With Safety over OPC UA, connections can also be established or terminated at runtime. A given interface can be used in turn by different partners, thereby allowing a connection to be established dynamically. Benefiting from this equally are modular machines, autonomous guided vehicles (AGVs), autonomous moving robots (AMRs), and tool changers.

In contrast to today’s functional safety communication protocols, nodes no longer have to know all of the others initially at the project planning stage. This makes it possible, for example, to add a new mobile robot to a system without having to reconfigure all of the existing machines.

**Advantages of the PROFIsafe solution**
By retaining the proven PROFIsafe principle, it will be significantly easier in the future for the manufacturers to establish a functionally safe connection between controllers. Due to the many proven uses of PROFIsafe, this also ensures high acceptance by manufacturers and end users, as well as notified bodies such as certification authorities. Also nice about this is the fact that no specific requirements are necessary for non-safety components. An unlimited number of network nodes is thereby possible, and the communication speed is not limited.

That this concept is functional was shown by an initial trial implementation as a proof of concept at the PI joint stand at SPS/IPC/Drives 2018. The specification, which is currently under review, will be completed in time for Hanover Fair 2019. Test specifications in which test procedures are defined are being prepared concurrently.

The result of the collaboration between PI and the OPC Foundation is a practice-oriented as well as sustainable solution in the area of functional safety that is supported by the majority of manufacturers and users.

_for more information contact Dee Botha, +27 061 340 0681, dee@sasisa.co.za_

---

**Ready for data communication of tomorrow.**

**Everything for industrial networks**
Industrial networks are becoming more complex. With comprehensive solutions for tomorrow’s industrial data communication, Phoenix Contact is your long-term partner for mastering the challenges of digitalization.

_for more information:_

| JHB: | 011 801 8200 |
| CT:   | 021 930 9666 |
| DBN:  | 031 701 2701 |
| PE:   | 041 364 0415 |
| www.phoenixcontact.co.za |
Mimic’s SH300 text display for PLCs

Mimic Components’ SH-300 with text display is a long standing and reliable electronic device for programmable PLCs and other intelligent controllers equipped with a communication interface. It also functions as a small HMI.

Communication is downloaded into the SH-300 Text panel together with project files, therefore making it unnecessary to edit the communication program in a PLC separately. An additional benefit to the user is the option to select one of multiple languages. The text will display in the selected language, on the backlit LCD screen, and language editing is done via the menu. The SH-300 comes with LangEditor software, which is compatible with Windows.

Real-time data monitoring and information processing is reflected via the PLC, informing the user of equipment status. The device includes control functions set in the front keypad such as texting and bar graphs with directional and numeric keys that allow the user to set, modify and change the status or functionality of the device.

The unit can be connected with many PLCs and has a password protection, real-time alarm functionality, displays the current status line by line and allows for 24 symbols across four rows, making the display clear and informative. The IP65 front panel is waterproof and greaseproof, while working environmental temperature is -10 to 60°C, and the cooling method is convection, making the SH-300 a functional and practical device for use in many industrial applications.

For more information contact
Mimic Components,
+27 11 689 5700, sales@mimic.co.za,
www.mimic.co.za

Selecting the right PLC

Automation projects, big or small, start with a specification. Here are five factors to consider when choosing a PLC vendor.

Broad range of devices

The selected brand must have a complete product range to meet the requirements of customers. PLCs must be available with sufficient memory to support I/O, and log and manipulate historical data in addition to executing the control program. Where execution speed is critical, the CPU processing speed must be considered as well. Some additional questions to ask are: What are your sector’s standards? Do applications need to comply with hazardous environment standards, CFR-21.11, or the spray-and-wipe standards of the food and beverage sector?

Influenced by the mobile industry, customers expect HMI colour touch-panels to provide the communication window between operator and system. In cases where space is at a premium, PLC + HMI all-in-one controllers have distinct advantages. Some PLC manufacturers even provide PLC + HMI controllers with on-board I/O modules, which in addition to saving space, also reduce wiring requirements.

Data communication

Flexibility is key. The selected brand of PLC should support multiple protocols to ensure interoperability with existing and future applications, as well as third-party devices. Important industrial protocols include Modbus, CANopen and EthernetIP. Some brands also support protocols, such as SNMP and FTP. Check to see if your PLC manufacturer provides software utilities that enable you to implement proprietary third-party protocols, whether serial RS-232/485 or TCP/IP.

Users can also benefit through increased visibility of operating data and diagnostic information. The ability to access a PLC via Web browser and VNC support are excellent methods of remotely accessing a PLC, while SMS messaging and email are handy for notification via mobile devices.

Intelligent software

Saving time is the primary benefit of intelligently-designed software. There are two particularly important factors to consider.

Ease of use: ergonomic design eliminates the need to search for elements while programming. In addition, logical, consistent construction saves time, since the programmer intuitively knows what to do even when programming a particular task for the first time.

Re-usability: whether programming in ladder or C functions, designing HMI screens and Web pages, or creating custom controls, the ability to reuse work across projects saves time.

Service and support

Look for PLC manufacturers that offer a high level of customer care. Make certain that support, whether technical or sales, is easily available and prompt. Personal support – meaning from people not automated systems, which is available 24/7 is extremely valuable.

This is what can make a difference when meeting tight project deadlines. Support documents, specifications and guides, should be readily available. Select a company that provides support and documentation at no additional charge.

Total cost of ownership

Development and future maintenance costs can affect profit margins. Therefore, when purchasing a PLC, select a company committed to supporting it over the long term. This can have a major impact on the success of an industrial automation project.

For more information contact
AC/DC Dynamics, +27 10 202 3300,
info@acdc.co.za, www.acdc.co.za
Infrared thermography is a widely-accepted preventive maintenance technology, both for land-based and maritime applications. Electromechanical assets like motors, especially on ships where both vibration and airborne contamination can be problematic, are often susceptible to sudden unexpected failure. Maintenance and repair is not an easy task on a vessel at sea and, every three to five years, cruise lines send their ships into dry dock for both aesthetic and functional upgrades as well as routine maintenance.

After completing its research, a large cruise ship builder determined that its fleet of ships should retrofit IR windows as an alternative method of conducting inspections. Critical electrical equipment was identified and IRISS VPT-75 windows were installed into panel covers in the engine room. It was determined that more frequent inspections of energised equipment could be attained by retrofitting IR windows for routine inspections, which did not trigger elevated levels of PPE as required by regulation, thus also reducing inspection time and maintenance costs. The maintenance team decided to integrate infrared thermography as a first line of defence, and thermal imaging is now being used to capture baseline images and trends on all critical electrical equipment.

When the ship was brought in for scheduled dry-dock, the electrical equipment was completely de-energised and the windows were retrofitted. Approval to re-energise and operate the equipment was obtained and locks and tags were removed. The electricians confirmed the equipment was operating at normal load levels and allowed sufficient time for the equipment to become thermally stable. Infrared thermography was then performed on the equipment and any issues were noted. Inspections are now scheduled on a semi-annual basis and spot checks are performed whenever any warning signs are picked up by maintenance and operations staff.

An ROI with savings in time and money was achieved through the implementation of IRISS transparent polymer infrared windows. This allows more frequent inspections and additional regulatory safety compliance was also achieved. Even though many of the practices are similar in the marine industry to those of land-based thermography, there are different potential problems, concerns and safety issues that most land-based thermographers would never encounter. Thermography for the marine industry is just as important to overall equipment reliability as it is for land-based installations.

For more information contact
R&C Instrumentation, +27 11 608 1551, info@randci.co.za, www.randci.co.za

Vibration in rotating machinery is the oscillation of machine components such as drive motors, driven devices (pumps, compressors, etc.), and the bearings, shafts, gears, belts and other elements that make up mechanical systems.

Vibration itself is not a problem, but excess vibration is a symptom of internal issues that could shorten the lifespan of equipment. More than half of unplanned downtime can be attributed to mechanical failures. While many things can impact the life of a machine, once the first signs of degradation appear, it is generally only a matter of months before complete failure occurs. Vibration testing provides a way to determine where a machine is on the failure curve, allowing maintenance teams to react as needed: the higher the overall vibration of a machine the worse the condition.

Comtest has on offer the Fluke 805 vibration meter that measures overall vibration, bearing vibration and temperature simultaneously. Bearing condition is assessed automatically with use of Crest Factor Plus (CF+) and temperature is often used as a second opinion that confirms the bearing assessment based on vibrations. With Fluke Connect for the FC enabled models, trend plots on all available parameters are easily created. The condition of most machinery can be determined instantly through alarm levels that are programmed into the product.

The Fluke 805 delivers reliable, repeatable results, thanks to the innovative sensor and tip design that minimises measurement variations caused by angle or pressure. This unique sensor compensates for the pressure applied during measurement, and provides reliable results both for overall vibration (10-1000 Hz) and bearing measurements (4000-20 000 Hz).

The meter provides a four-level severity scale (good, satisfactory, unsatisfactory and unacceptable) for both overall vibration and bearing condition. Rather than seeing unexplained lights or numerical indications, users can easily assess the severity of the situation with the text-based alerts. The 805 can hold up to 3500 measurements and, if long term trending is required, users can easily export data through a USB connection. No special software is needed because the product is shipped with a disk containing prebuilt Excel templates.

www.instrumentation.co.za  June 2019  75

For more information contact Comtest, +27 10 595 1821, sales@comtest.co.za, www.comtest.co.za
Effective day-to-day monitoring of essential assets

Efficient operation of essential assets is key in achieving productivity and operational targets. Facilities, manufacturers, operators, and producers can move forward in planning for their output by having smoothly functioning assets.

Every industrial facility (either discreet or process) comprises of around 5% critical assets such as generators, turbines, compressors etc. These critical assets are nearly always installed with online protection systems, and in most cases, with online prediction systems as well. This equips operators and maintenance personnel with tools that inform them of their asset status round the clock, throughout the year.

Around 25-30% of the assets such as pumps, heat exchangers, non-critical compressors, and more are classified as essential assets. Failure of these assets can impact significantly on plant throughput. Such assets are usually not instrumented for real-time monitoring. Current industry practices in maintaining such assets are based on weekly, monthly or quarterly preventive maintenance rounds, as well as predictive maintenance processes done through portable handheld vibration analysers based on asset classifications. Without online monitoring, these assets are often subjected to reactive maintenance activities and consequently unexpected downtime and higher maintenance costs.

Costly repairs without prior notice of failure

According to the US National Response Centre, it costs approximately 50% more to repair a failed asset than if the problem had been addressed prior to failure. Studies from InTech 2012 show that 70% of most maintenance budgets are reserved for essential assets, while 3.5% of unplanned shutdowns or slowdowns are caused by the breakdown of essential assets.

Take for example the role of an operator tasked to monitor and prevent the breakdown of a pump. Once the pump he is operating starts to show signs of degradation, the operator has the skills and the experience to determine that there is a problem with the pump, which needs to be fixed. The next logical step for the operator is to contact the maintenance team. Now, time becomes a critical component to the maintenance process as the teams try to identify what needs to be fixed and execute the repair.

Improving reliability with essential asset monitoring

Considering these factors and risks with essential assets, Emerson has been providing solutions to aid organisations maintain their assets. Through the methodologies of Operational Certainty and Project Certainty, Emerson equips industrial organisations with proven approaches of top quartile performers.

Project Certainty is a proven approach to achieving performance goals to move strategic engineering decisions into the earliest project stages. Operational Certainty, on the other hand, is a methodology that helps organisations to pinpoint the cause of poor performance, enabling them to prioritise actions that can yield the greatest improvement and establish a scalable work plan.

With the advent of IIoT solutions, Emerson provides practical technologies that also deliver visibility to operations, maintenance, and reliability teams for essential assets. These innovations provide data coverage through instrumentation and also through the broad range of analytics software and platforms included in Emerson’s Plantweb portfolio. Through this digital ecosystem, organisations can transform operations with measurable improvements in reliability, safety, energy management, and overall operations.

The next step of Emerson’s IIoT solutions involves relaying the health analytics of essential assets to the relevant person in the time required through the Plantweb Optics platform. Relevant operators can access the critical data through desktop tablets and smartphones, with a connection to the CMMS system for work order generation.

These IIoT applications provide support for essential assets and effective monitoring for plant teams through the optimisation of work routines, and prioritisation of activities that are no longer time-based, but now condition-based. Operators can therefore be informed in advance when an issue with an essential asset is discovered. With reduced reactive maintenance, plant operations can now enjoy machinery uptime, enhanced production, reduction in unnecessary inventory and better safety implementation.

For more information contact Devesh Roopnarain, Emerson Automation Solutions, +27 11 451 3700, devesh.roopnarain@emerson.com, www.emerson.com
“All-in-one sensor” reduces costs

This new thermal compressed air meter for compressed air in industrial use distinguishes itself as a real all-rounder. It does not only have an integrated temperature sensor but it also features a pressure sensor, allowing the user to read four process values at once (volumetric flow, pressure, temperature, totaliser = total quantity meter) and optimise the production.

Integration of the SD compressed air meter into the maintenance unit of existing or new installations provides additional advantages. Now the process values of compressed air in industrial use can be effectively monitored in common compressed-air networks via the integrated TFT display, which allows for selection between four different and individually adjustable graphic layouts. The process values can also be transmitted via IO-Link.

*Visit us at the Africa Automation Fair 04 to 06 June 2019, stand D1 to view all our live demonstrations and get to know all our new products released from the Hannover Fair.*
Fieldlogger for data acquisition

The Fieldlogger is a great asset to the Novus automation range of products. It is one of the most comprehensive instruments for the acquisition of data recording, and is capable of analog and digital variables for recording, with email capability including automated data and alarm transfer. It also features USB memory stick support, 24 bit resolution, extensive communications capacities and optional LCD display which can be remotely mounted. It can stand alone or be integrated into existing systems.

The Fieldlogger can act as a Modbus RU master and read registers from slaves. Other features are functional mathematical operations in the input channels, high speed, high connectivity, large memory, and ease of configuration and operation. These make it a sought after device for long term buyers looking for a cost-effective price. The Fieldlogger is reliable, versatile and powerful.

Other options include exclusive 320 x 240 pixel colour HMI that allows local remote mounting, an extension kit for HMI remote mounting and a 24 V AC/DC powered model. Complementary products include the Novus FieldChart and Novus SuperView, all of which have accessibility to Novus Cloud. Should potential customers not require all these features, the Fieldlogger can be purchased at a reduced price without Ethernet interface.

Mimic’s company representatives can give a product demonstration on their business premises, with after sales support via telephone or call outs.

For more information contact Mimic Components, +27 11 689 5700, sales@mimic.co.za, www.mimic.co.za

Servo motor equipped with SIL3 encoder

The new MS2N synchronous servo motor is Tectra Automations’ latest product offering to the electric drives and controls industry. The range combines high dynamics, compact dimensions and excellent energy efficiency, with more torque, higher speeds, a practical single-cable connection and extensive options for the highest servo performance.

Over 50 motor types are available in 6 motor sizes, 5 motor lengths, and more than 20 fully configurable options, covering maximum torque up to 360 Nm and maximum rotational speeds up to 9 000 rpm. They are 30% smaller than their predecessors with rotor inertia optimised for maximum dynamics and adaption to motor masses.

The product line comes equipped with a quick locking mechanism which is simple, practical and reduces installation time. It also includes a certified SIL3 encoder to allow maximum safety levels for all safety functions. This includes safe absolute end position, which replaces the hardware limit switch by software, 31 configurable safe cam areas, reduced commissioning due to semi-automatic support and PC-free device replacement when servicing. The motor has a maximum torque error range of 5%, which compares well with the standard.

Applications in which this product may be utilised include force and pressure control in robotics and production machines and condition monitoring, like detection of production faults or bad parts.

For more information contact Wiets Pretorius, Tectra Automation, +27 11 971 9400, wiets.pretorius@boschrexroth.co.za, www.hytecgroup.co.za

Multi-colour touch sensors with IO-Link

The new multi-colour touch sensors from ifm bring flexible adaptation to any application. Where many different sensors were required before, one individually adjustable sensor is sufficient today. The NO/NC function, or the colours for different operating states, can be set within seconds. In addition, dynamic, static or bistable switching of the sensor can be selected.

Adaptable to the environment

The adjustable sensitivity allows use in very wet environments or actuation with gloves. The implemented delay time prevents unintentional switching of a sensor. All settings remain stored even if the sensor is used without IO-Link. The sensor also counts the switching cycles for demand-oriented maintenance of the machine.

For more information contact ifm – South Africa, +27 12 450 0400, info.za@ifm.com, www.ifm.com
Jasco’s Webb Industries has introduced Telegärtner’s new, modular rail-mount fibre optic distributor. The all-new STX distributor can be extended according to actual needs. The stackable modules allow quick and easy additions and changes at any time. A vast portfolio of modules with different adaptors offers the flexibility that is needed in today’s industrial networks. In spite of their compact size, the modules offer more than enough space for fibre slack.

**Variety of connecting hardware**

The STX rail-mount distributor offers a vast portfolio of different modules that accept 12 fibres and ST, SC and LC adaptors as well as a high-density LC module with 24 fibres. All modules are available for OM1 to OM4 multimode and OS2 single-mode fibres.

Customers can select from a large variety of modules for pre-terminated breakout and mini-breakout cables. This includes modules with an integrated hinged splice cassette and pigtails stripped ready-to-splice, as well as modules for pre-terminated fibre optic cables.

The adaptors are mounted at a 45-degree angle so users can conveniently plug patch cords in and out using a minimum of valuable space. Horizontal cables can enter the modules from four different directions. This gives the installer the opportunity to decide on site about the best cable routing, which offers users maximum flexibility.

**Small dimensions**

With dimensions of just 35 x 215 x 155 mm (two-module width), the compact modules make the most of available space, enabling users and installers at the same time to conveniently patch and store any fibre slack. The modules can be mounted on TH35 rails as specified in DIN 60715, as well as on flat surfaces/walls.

---

**Static and rotational torque sensors**

With the new compact 8661 series of torque sensors, Burster has extended its portfolio to include static and rotating torques over the range from 0,05 to 200 Nm. In addition to the highly accurate measurements, the sensors offer excellent reliability and security. This also applies to the version with optional measurement of angular position and rotation speed where the torque sensor offers a resolution as fine as 0,09°. An optional USB interface provides easy mobile display and documentation of the measured values.

This sensor comes into its own in fields such as precision and micro-mechanics, test bed equipment for electric motors, or in the automobile industry where torque and associated angular position and rotation speed are important process magnitudes.

The signal from the full bridge strain gauge signal is digitised at the shaft itself and is converted into a 0 to ±10 VDC signal by a 16 bit D/A converter located on the stator. In light of the need to minimise the necessary servicing cycles, the power is supplied inductively while the measured signal is transmitted optically. As a result, the measurement is obtained without any wearing parts and a high immunity to interference is ensured. The maintenance-free operation and the increased capacity to handle high rotational speeds make this series in sensors ideally suited to efficient application in industrial manufacturing and assembly equipment where activation, adhesion, breakaway and tightening torques must be measured.

Continuous operation and a high dynamic range of up to 25 000 RPM are supported effortlessly by the optimised mechanical design. A high resolution output signal for the optional angular displacement and rotational speed measurement facilities is achieved through optical sensing of an incremental encoder disk that incorporates two offset tracks and four-edge sampling. An operating status display (green/yellow/red LED) gives the user a range of status information, which simplifies commissioning.

The USB interface and the PC-based software permit convenient operation away from mains power, as well as mobile application for field measurements. A driver package for linking into custom user’s own programmes is included free of charge.

**For more information contact**

Anastas Schnippenkotter, ASSTech Process Electronics & Instrumentation, +27 11 708 9200, info@asstech.co.za, www.asstech.co.za

---

**Rail-mount fibre optic distributor for network expansion**

For more information contact Webb Industries, +27 11 719 0000, webb@webb.co.za, www.webb.co.za
Handheld control valve tester

In the past, control valve testing meant using complicated testers that required extensive training, the removal of the valve, and often one-to-two hours of test time on the bench. Comtest is therefore pleased to announce the arrival of Fluke’s new 710 mA Loop Valve Tester. The device allows technicians to source the 4-20 mA signal while it interrogates HART data to collect critical information about the valve’s position and status, providing quick checks of control valves while they are in place. With built-in test procedures and an intuitive interface, the Fluke 710 allows technicians to perform valve tests, while the quick-check results provide at-a-glance diagnostics to make faster maintenance decisions.

The 710 features pre-configured valve tests for reliable and repeatable testing. The built-in routines include:

• Manually changing the mA signal and viewing the HART position and pressure variable information.
• Full range ramping of the mA signal from 4 to 20 mA while recording the 0-100-0 percent position, or the pressures applied that move the valve from 0-100-0 percent.
• Stepping the mA signal on the input to the valve in steps and evaluating the valve’s response to the mA input changes.
• Speed tests to determine how fast the valve can open or close.
• Bump and partial stroke tests that help test valves over a portion of their range so they can be tested in a live process.

Test results are stored in the memory of the tester from where they can be uploaded to the included ValveTrack analysis software. ValveTrack allows users to:

• Upload and plot logged valve tests taken in the field.
• Compare previously uploaded to recent tests.
• View valve test history by HART Tag ID.
• Export valve test data for additional analysis.

For more information contact Comtest, +27 10 595 1821, sales@comtest.co.za, www.comtest.co.za

Magnetic sensors for C-groove cylinders from SMC

Turck’s portfolio of magnetic field sensors is being expanded: The BIM-UNC product series was specially optimised for perfect mounting in the C-groove pneumatic cylinder of SMC. The sensors can be inserted from the side into the groove with one hand and without the need for any additional mounting accessories. A quarter turn of the screw causes the thread to press the sensor against the pneumatic cylinder and secure it against vibration. A tightening torque of only 0,1 Nm is required to fasten it and the cylinder is not damaged in the process. The series is ideal for applications in materials handling and automated assembly or in punching machines and industrial robots. Magnetic field sensors are used particularly for measuring the piston position in pneumatic cylinders. The sensors of the UNC series with protection to IP67 are specified for a temperature range from -25 to 70°C. A 2 m cable variant as well as M8 and M12 pigtails are available as standard, with either PNP or NPN output functions.

For more information contact Brandon Topham, Turck Banner, +27 11 453 2468, brandon.topham@turckbanner.co.za, www.turckbanner.co.za

Photoelectric sensor for demanding applications

The new Allen-Bradley 42AF RightSight M30 photoelectric sensor from Rockwell Automation is the latest addition to the company’s smart sensing portfolio. Built with improved environmental resistance and long distance detection in a mid-sized, right-angle housing, the RightSight M30 smart sensor offers the flexibility and performance required for a wide range of high demand applications.

“Our new photoelectric sensor was developed to help increase reliability in harsh environments where dirt or undesired particles could accumulate on the sensor lens,” says control systems business manager, Christo Buys.

Built with IO-Link capability, the sensor easily integrates into the connected enterprise by delivering data and diagnostics from the sensor directly into a control system to help minimise downtime and increase productivity. With this capability, the sensor provides information such as signal strength, location, proximity alarms and timing functions that help create operational efficiencies and streamline troubleshooting. The 360 degree high visibility LED power and status indicators further assist in setup, monitoring and troubleshooting.

The durable, right-angle housing offers a universal 30 mm nose and 18 mm base mount for fast, flexible installation and replacement. The IP67/IP69k/80 bar rated housing is fully sealed, enabling the RightSight M30 to withstand tough industrial environments, including those involving high pressure and high temperature washdowns. Featuring multiple sensing modes, the sensor is also available in easy-to-apply, adjustment-free models and teachable versions that adjust sensitivity and output configuration at the push of a button.

For more information contact Christo Buys, Rockwell Automation, +27 11 654 9700, cbuys@ra.rockwell.com, www.rockwellautomation.co.za
For more information on these and other suppliers please see www.ibg.co.za

Gear units and motors from SEW-EURODRIVE Pty (Ltd) have always set the trend and established new standards in drive technology. For this reason, the quality label “made by SEW” has become a hallmark of quality in the drive industry. Market-orientated products developed and manufactured in-house, as well as uncompromising quality, are the cornerstones of our success.

SEW-EURODRIVE - Driving the world

Cape Town Branch
Tel: +27 21 528 7600

Durban Branch
Tel: +27 31 902 3815

Nelspruit Branch
Tel: +27 13 752 8087

Port Elizabeth Branch
Tel: +27 41 372 2244/6

SEW-EURODRIVE (Pty) Ltd
Eurodrive House
Cnr. Adcock Ingram & Aerodrome Roads, Aerotrust Ext 2
Johannesburg
P.O. Box 90004
Bertsham 2013
Tel: +27 11 248 7000
Fax: +27 11 248 7289

www.sew-eurodrive.co.za

COME VISIT OUR STAND
AT THE AFRICA AUTOMATION FAIR
STAND NUMBER: H07

4TH-6TH JUNE 2019

AFRICA AUTOMATION FAIR
54000156-2019