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Michael Brown Control Engineering, Parker Hannifin SA, Beckhoff Automation, SMC Corporation South Africa, BMG, Schneider Electric SA, Yaskawa Southern Africa
Digital transformation or the way of the dinosaur?

The Fourth Industrial Revolution (4IR) recently had its fair share of exposure in South African industry circles. First, the German & EU Chamber’s Working Group Industry 4.0 kicked off a series of online events around the successful adoption of 4IR in South Africa. And shortly thereafter, the SAIMC hosted a webinar on the subject of preparing South African businesses for the 4IR.

Three key points I picked up on during the presentations were upskilling of the local workforce, infrastructure development (in particular 5G), and the importance of aligning technology to business benefits that will make local manufacturing more competitive. As Oratile Sematle pointed out during the SAIMC webinar, companies are being forced to change because customers now demand levels of detail in supply chain information that only the data-centric technologies of the 4IR can provide.

In essence, the problems that face modern manufacturing companies have become more complex because today’s consumers demand variety of choice that far exceeds anything industry experienced in the past. Staying ahead in such an environment requires solving increasingly complex supply chain and production line problems, each involving a vast number of parameters which, unfortunately, do not behave according to convenient linear relationships. New technology is therefore required that can simulate the multitude of possibilities and then iterate down to the most effective choice for any given set of circumstances.

At the back end are the big data engines of the modern smart factory, which feed the artificial intelligence algorithms that crunch out the simulations. At the front are the workers, connected to their operational environment through a host of augmented and virtual reality devices updated in real-time with whatever information they require, be this maintenance or production related.

Therefore, as important as it is for South Africa to develop an efficient 4IR-enabling framework, as addressed by the EU Chamber and the SAIMC, amongst others, it is equally important that individual companies take on responsibility for their own unique 4IR implementation plans.

To help them, consultancy firm PwC has formalised its ‘Eight Commandments’ for digitising the shop floor workforce. The commandments stress the earlier point that new technology should only be deployed once the associated business benefits are properly defined and understood. Once it is determined that ubiquitous access to real-time decision support is the most effective way to solve the problems under consideration, then it is time to consider the technologies of the 4IR and the PwC deployment guidelines.

The writing is on the wall, South Africa must commit to a 4IR implementation strategy or jeopardise its global competitiveness. However, on its own, this is not enough to transform an ailing local manufacturer into a top industry performer. Individually, companies have to get to grips with the complexities of competitive production and consider how to leverage an advantage for themselves through intelligent use of 21st century digital technology – or risk becoming extinct.

Interested readers can find detailed reports on the EU Chamber and SAIMC webinars on pages 4 and 7, while the full PwC article appears on page 30.

Welcome VOLUME 36 NO 9 SEPTEMBER 2020

COVID-19
South African Resource Portal
See www.instrumentation.co.za for more COVID-19 related articles

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**Holographic headset creates the perfect training experience for runners**

Runners know that getting the most from each run requires training with a partner who is slightly faster than you and pushes you to keep up. Unfortunately, in today's world – and with longer-term social distancing requirements – finding the right partner and coordinating regular times and locations for runs can be difficult. But a couple of recent graduates from Lakeside High School in Seattle, Bill Gates' alma mater, have used augmented reality to create an innovative solution to this problem. It's called the Ghost Pacer.

The Ghost Pacer is a newly developed set of augmented reality glasses designed specifically for runners. With a patented optical system, it weighs just 90 grams and has the processing power to create a realistic avatar in 3D space. It works by projecting a holographic avatar that users can race against outdoors. Integration with the fitness app Strava allows users to race against avatars that replicate their friends' paths and speeds from previous workouts, letting athletes train together virtually, even if they can't physically run together.

"Nothing is a perfect substitute for running with another person," says CEO AbdurRahman (AR) Bhatti, a former all-state cross-country runner himself. "But racing against a holographic avatar that you can train with anywhere at any time is the next best thing."

AR originally came up with the idea while training solo for an upcoming cross-country season and being frustrated that he couldn't hit his target times along his training routes. He realised that training was way more effective while running with others. Since aligning schedules with other people proved nearly impossible, he came up with the idea of the Ghost Pacer - a partner you can run with anywhere and at any time.

For the past three years Bhatti and Jensen Turner, the company's CTO, have worked with a team of experts in technology and fitness, alongside a dedicated team of their high-school classmates to create Ghost Pacer. "This is a fitness product that implements mixed reality in order to add a competitive boost to each workout," concludes Bhatti. "We like to think of the Ghost Pacer as being built for runners, by runners."

www.ghostpacer.com

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**German & EU Chamber hosts inaugural Working Group Industry 4.0 online session**

On 18 August, the German & EU Chamber’s Working Group Industry 4.0 hosted the first in a series of online events around 4IR and its adoption in South Africa. Under the leadership of moderator Frank Aletter, deputy CEO at the Southern African German Chamber of Commerce and Industry in Southern Africa, the event provided an overview of the report of the Presidential Advisory Commission on the Fourth Industrial Revolution (PC4IR), delivered to President Cyril Ramaphosa on 6 August.

Tim Abbott, the German Chamber’s newly elected president and CEO of the BMW Group South Africa, opened the presentations with a welcome to delegates and an overview of how BMW is using the technologies of 4IR to achieve its efficiency objectives and incorporating features such as autonomous driving technology into its vehicles.

Following the opening address and speaking in his capacity as deputy chair of the Presidential Commission on the Fourth Industrial Revolution, the University of Johannesberg’s vice chancellor, Professor Tshilidzi Marwala, delivered the keynote presentation on the recommendations of the report.

Marwala outlined how South Africa could not remain competitive in global markets unless it invested in the new technologies of the 4IR: Artificial Intelligence (AI) and 5G served as examples. As a guide to the key focus areas, Marwala summarised the recommendations of the PC4IR as follows:

- Invest in human capital.
- Establish an AI institute.
- Establish a platform for advanced manufacturing and new materials.
- Secure and avail data to enable innovation.
- Incentivise future industries, platforms and applications of 4IR technologies.
- Build 4IR infrastructure.
- Review and amend (or create) policy and legislation.
- Establish a 4IR Strategy Implementation Coordination Council in the Presidency.

In closure, Marwala stressed that the Strategy Implementation Coordination Council must be made up of experts in the fields of 4IR technology and, above all, that the ethos of the recommendations demands that the role of the private sector must be elevated beyond the levels which are presently considered normal in South Africa.

The final presentation, given by Marc Van Pelt, MD of Pepperl+Fuchs in South Africa, and chairperson of the German & EU Chamber’s Working Group Industry 4.0, outlined the primary roles of the working group as follows:

- Advocate on behalf of its members for policy clarity, certainty and changes that will strengthen the business climate in South Africa.
- Raise impediments to expanded trade and investment between the EU and South Africa with the appropriate stakeholders.
- Contribute to the process of identifying appropriate and mutually beneficial solutions.
- Contribute to the process of identifying appropriate and mutually beneficial solutions.

Van Pelt explained the importance of aligning these objectives with those of the 4IR Strategy Implementation Coordination Council, once it has been formed. Currently, the EU Chamber is transitioning into a Chamber of Chambers in order to consolidate knowledge, which requires a redefinition of strategy and mandate of the current working groups.

Van Pelt concluded with an explanation to delegates of a proposal to transfer the existing Working Group Industry 4.0 to the Working Group 4IR, in line with global trends. The idea is to foster close interaction between the experts on the Presidency’s 4IR Strategy Implementation Coordination Council and those on the German & EU Chamber’s Working Group 4IR, in the interests of knowledge transfer and future business development.

**For more information contact Marc Van Pelt, Pepperl+Fuchs, +27 10 430 0201, marcvanpelt@de.pepperl-fuchs.com, www.pepperl-fuchs.co.za**

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SJC Creative wins Media Communications Specialist Award

Sue Charlton.

SJC Creative, a specialised B2B and industrial media communications consultancy, awarded the Media Communications Specialist Award 2020, Gauteng, at the Corporate LiveWire SA Prestige Awards.

“I was thrilled to hear that we had won this award, a real feather in our cap in our 16th year of consulting,” said Sue Charlton, owner of SJC Creative. “It is important that we understand of consulting, “ said Sue Charlton, owner of SJC Creative, a real feather in our cap in our 16th year of the award, the Media Communications Specialist Award, by Corporate LiveWire SA. The award was presented to SJC Creative for its outstanding work in media communications and marketing. The judging panel noted the company’s innovative practices, value, ethical or sustainable methods of working, as well as consistency in performance. The winners selected are those who can best demonstrate their strengths in these areas.

For more information contact Sue Charlton, SJC Creative, +27 87 701 3860, sjc@worldonline.co.za, www.sjccreative.com

Local manufacture of ventilators set to save lives throughout Africa

Local production of bridge ventilators for the Africa Medical Supplies Platform (AMSP) is in full swing at ESG Medical Equipment’s manufacturing facility in Johannesburg.

“In response to the urgent need throughout the African continent for personal protection equipment during the COVID-19 crisis, ESG Medical Equipment, in partnership with other local companies, is set to help AMSP save lives through the manufacture and procurement of specialist medical equipment,” says Gavin Pelsel, CEO, Engineering Solutions Group (ESG), part of Invicta Holdings. “African and global philanthropists have teamed up with local businesses to help secure urgently needed ventilators, breathing support devices and other medical equipment that will assist the people of Africa in the fight against coronavirus.

“The ESG Medical Equipment team is working closely with engineers from Virgin Orbit and Virgin Galactic, to produce high quality bridge ventilators, using locally-sourced materials and components. The design of these ventilators was provided by Virgin Orbit at no cost as part of the Virgin Group’s philanthropic efforts to help flatten the curve in Africa.

“These ventilators, along with other medical equipment and PPE, are available from the African Union’s (AU) online pool procurement platform, AMSP. This initiative was established to enable easy procurement, coordination and distribution of medical supplies for all AU member nations.

“This venture is a perfect example of how effective teamwork can be. And in this case, when over 1,2-billion lives in Africa are vulnerable, a co-ordinated effort to combat the pandemic is even more critical. Our team is proud to be part of this programme and to work with the finest business leaders and world-class engineers.”

According to South African President and AU chairperson, Cyril Ramaphosa, who officiated at the launch of AMSP in June, the online platform is “the glue that will bind the continent together.”

ESG Medical Equipment will soon produce oxygen helmets, also based on the free design from Virgin Orbit. These are critical to help open up the alveoli in infected lungs and delay or prevent Acute Respiratory Distress Syndrome in those suffering the effects of COVID-19.

For more information contact Darryn Wright, Engineering Solutions Group, +27 11 620 1516, darrynw@esggroup.net, www.bmgworld.net

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Open Beckhoff technology sets adoption record

Beckhoff introduced the EtherCAT real-time Ethernet system to the market in 2003 and disclosed its details within the EtherCAT Technology Group (ETG) the same year. “The ultra-fast communication system has taken the automation world by storm ever since,” says Thomas Rettig, senior manager of Control Systems and Communication Architecture at Beckhoff. A fact that was underscored further when the ETG issued its 3000th EtherCAT vendor ID in July 2020.

Now, with 3000 officially registered device manufacturers, EtherCAT has the broadest base of adoption in the industrial Ethernet market. According to the ETG, the user organisation with the second-highest number of registered manufacturers has only about half as many. According to Rettig, this success is based mainly on the technology itself because it delivers as many advantages to users as it does to the manufacturers of EtherCAT devices: “EtherCAT is the ideal technology for the diverse requirements of controllers as well as peripherals. On the controller side, you want to have as little specialised hardware as possible in order to put existing computers to use, while on the device side you want total hardware integration to save costs and reduce complexity.”

With EtherCAT, all complex and time-critical functions are integrated into the device controller chips, which are available from 12 different semiconductor producers. Simple devices require no microcontroller and therefore no software since some of the chips already come with I/O interfaces built-in. Since the EtherCAT controller is fully software-based, it only needs a conventional Ethernet port, which means that it can be implemented on almost any PC or microcontroller board with no additional hardware. In addition, there is the broad spectrum of available real-time operating systems – about 35 RTOs are available for EtherCAT controllers.

The easy EtherCAT implementation provided by the ETG’s extraordinary ‘ecosystem’ with support from Beckhoff is the second major factor for the system’s success. It ranges from extensive implementation guidelines and the Developer Forum on the organisation’s website with almost 7000 posts about the development support provided by ETG employees. The ‘Slave Stack Code’ and related software tools, which Beckhoff supplies to all ETG members at no charge, has already been downloaded over 11 000 times. And the Conformance Test Tool, which ensures compatibility with the standard and is also a practical development tool, is another important building block of the EtherCAT ecosystem.

Prepared South African business for the 4IR

Incorporated into Electra Mining Africa 2020 Connect’s Automation Day theme on 8 September, the SAIMC hosted a well-attended webinar under the title, ‘Preparing South African business for the 4IR, getting the business and technical frameworks right to ensure success.’

Moderated by Dave Wibberley, MD Adroit Technologies, the session addressed the competitive opportunities presented by the Fourth Industrial Revolution (4IR), as well as the threats faced by those economies that fall behind in its adoption.

First to speak, Marc Van Pelt, MD of Pepperl+Fuchs in South Africa, highlighted the vision of 4IR in the context of the recent report of the Presidential Advisory Commission on the Fourth Industrial Revolution, delivered to President Cyril Ramaphosa on 6 August. In particular, he stressed the need to invest in upskilling the youth of South Africa to equip them for employment in the new industrial era. Infrastructure was another point he emphasised, in particular, the importance of a 5G network to provide the critical ‘last mile’ of connection needed to complete the digital networks that underpin the 4IR.

Sasol’s Stefan Strydom (head of digital) and Oratile Sematle (digital lead) followed with a presentation on the importance of evaluating the business benefits of a 4IR project before any technology is actually deployed. In Sasol’s case, it was forced into digital transformation as there was just no other way to keep up with the demand for more accurate supply chain information from its customers. Sematle explained how modern customers are demanding a better experience in terms of order placement, product availability, lead times and order tracking, right through to delivery. Sasol risked losing its supplier status if it did not comply and was therefore forced to adopt 4IR technologies as nothing else was sophisticated enough to solve such complex, multi-dimensional business problems.

Analytics and insights specialist at Sasol, Annemarie van Coller, concluded the session with an overview of how the relevance and accuracy of data becomes the most important thing in the design of systems to solve problems similar to those faced by the previous speakers. She stressed the importance of understanding the data requirements within the context of the business problems that need to be solved and the need for multi-skilled professional teams to develop the required implementation models.

The message is clear. South Africa needs a workable 4IR implementation strategy or risk becoming an obsolete supplier in a globally evolving supply chain. Upskilling of people and a reliable 5G infrastructure are prerequisites.

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For more information contact Dane Potter, Beckhoff Automation, +27 79 493 2288, danep@beckhoff.com, www.beckhoff.co.za
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His work has proved invaluable to plants and has resulted in greatly improved performance and ROI.

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Last month I wrote about how the world is not going to wait for South Africa to ‘get ready’ for the new technology wave. Rather, it’s a matter of South Africa being prepared or being replaced by other African countries that have made themselves ready.

This month, I’m writing about contributions to our Skills Fund, which will enable contributors to obtain optimal B-BBEE points, while at the same time creating the possibility for industry to negotiate with education and training providers to supply ‘products’ (skilled young people) who can join our industry properly equipped to tackle the jobs at hand. In this regard, the SAIMC has initiated plans to empower those who are interested and willing to prepare themselves for the future and this will be done via an integrated Education and Training Plan.

As part of addressing the severe skills shortage in the South African automation industry, the SAIMC plans to provide bursaries to students in fields of study related to automation and manufacturing, as of January 2021, with preference for students from disadvantaged backgrounds.

The Society plans to implement this bursary programme, a first of its kind, to advance our efforts to launch the Qualification in Mechatronics at institutions of higher learning, to enhance the vision to develop our industry. Furthermore, through this programme, the Society will ensure the bursary spend of members is effectively channelled into creating a talent pool of graduates that meet the industry’s requirement for skills.

The programme will provide financial and social support, mentorship, coaching and other related upskilling interventions to young people with the aim of increasing their access to skills development and lowering drop-out rates. Included in the programme will be an entrepreneurial option for candidates who show business acumen.

As SAIMC members, your financial support is required for this industry transformation vision. Members are encouraged to contribute their skills development budget into the SAIMC Education Trust. The allocation of funds will be aligned to the members’ B-BBEE, Skills Development requirements. The bursary programme administration will include the skills development scorecard determination, allocation of funds in line with scorecard EAP targets and collection and filing of all verification documentation. Additional services to members include scorecard determination, advice and monthly reporting. Each SAIMC member will receive bespoke services to meet their B-BBEE requirements, which will be billed in line with the scope of work.

Further effort to develop the industry will be through sponsorship for the FIRST Technology Challenge and other similar initiatives, as well as career guidance for identified high schools. These opportunities will serve as a recruitment platform for the bursary programme. The recommendation is for organisations to make available their socio-economic development budget to fund this process.

SAIMC members and other sponsors may donate their skills development funds into the SAIMC Education Trust. The skills development and socio-economic development donations made to the Trust will be recognised by the B-BBEE Verification Agency as recognised expenditure for the listed elements. The programme will be expanded to upskill certain beneficiaries with entrepreneurship skills through enterprise and supplier development.

The SAIMC will source additional funding form other entities as follows: engineering automotive industry donations, DHET, SETA discretionary funds, NSF, other state skills development funding initiatives, National Treasury Jobs Fund, SEDA and donations through private industry.

Yours in automation,
Johan Maartens.
The branch held its first virtual meeting and sticking to 'old regimes' it was held on the first Wednesday of the month, but sadly not at the Durban Country Club. We were encouraged by the attendance which, whilst not as good as our real-life meetings, was pleasing and we are looking forward to getting back into a steady routine that will help get our regulars back on track.

A big thank you to ifm electronic for their kind participation and presenting on the most interesting topic: ‘Condition monitoring on gearboxes including a short case study on a ball mill gearbox failure analysis’. Ralph White, business development manager for the condition monitoring systems division at ifm, was our presenter for the evening and was articulate and knowledgeable. He has been working at ifm for over nine years and is a qualified electrician with his wireman’s licence, a level 1 thermographer and a category 3 vibration analyst with experience in many different industries, so he was very well qualified to present on this topic.

Conditioning monitoring is sometimes a neglected topic that is given insufficient attention, yet it is one of the many ways in which instrumentation can be applied very effectively to minimise the risk of unexpected equipment failure. Proper application can be an effective aid to scheduling planned maintenance shutdowns and hence benefit the bottom line. Ralph’s presentation covered all this comprehensively and sparked much interest from the (virtual) audience as the questions flew thick and fast.

We are working on a plan of action to ensure that members can still get CPD points, so watch this space!

The August virtual technology evening was hosted by Eric Carter of turboTRAIN on the subject ‘Instrumentation fault finding: why it is problematic and what can be done about it.’

During the presentation Eric outlined some of the knowledge deficiencies prevalent amongst instrumentation staff, especially the younger ones. He highlighted how these gaps can range from Ohm’s Law, through to understanding of thermocouples, lack of measuring ability, especially when it comes to current, through to ignorance regarding output devices.

He went on to highlight how staff need to be able to grasp the bigger picture; how to dive into the details from there and how training, including the use of graphic illustrations in the form of posters, can help to rectify the problems.

From there, he discussed the need to develop people, and to get the most from their capabilities. He also delved into the need for greater communication with the HR department, particularly when it comes to recruitment.

At the start of his presentation, Eric stressed that it would be about conventional I/O, but that a future presentation could do something similar with fieldbus devices. Of course, this could be extended to control systems and loop understanding. Hopefully, this will also spark some thought about the training systems we put in place for our people.

The branch held its first virtual meeting and sticking to ‘old regimes’ it was held on the first Wednesday of the month, but sadly not at the Durban Country Club. We were encouraged by the attendance which, whilst not as good as our real-life meetings, was pleasing and we are looking forward to getting back into a steady routine that will help get our regulars back on track.

A big thank you to ifm electronic for their kind participation and presenting on the most interesting topic: ‘Condition monitoring on gearboxes including a short case study on a ball mill gearbox failure analysis’. Ralph White, business development manager for the condition monitoring systems division at ifm, was our presenter for the evening and was articulate and knowledgeable. He has been working at ifm for over nine years and is a qualified electrician with his wireman’s licence, a level 1 thermographer and a category 3 vibration analyst with experience in many different industries, so he was very well qualified to present on this topic.

Conditioning monitoring is sometimes a neglected topic that is given insufficient attention, yet it is one of the many ways in which instrumentation can be applied very effectively to minimise the risk of unexpected equipment failure. Proper application can be an effective aid to scheduling planned maintenance shutdowns and hence benefit the bottom line. Ralph’s presentation covered all this comprehensively and sparked much interest from the (virtual) audience as the questions flew thick and fast.

We are working on a plan of action to ensure that members can still get CPD points, so watch this space!
Hybrid automation was approached by one of its clients to work on a CIP upgrade project for a food production plant based on the East Rand of Johannesburg. The plant had an existing CIP system, which had drawbacks in terms of effectiveness, safety risks and excessive operation costs.

**Principle of operation**

The CIP plant operates by making up CIP medium into 6000 litre tanks, which contain cold water, hot water and CIP chemical solution. Once the CIP medium is prepared to the desired specifications, it is supplied via a storage tank to the factory equipment being cleaned. The storage tank has a return pump on the outlet to return the dirty water back to the CIP plant. This water, depending on its conductivity, will either go to drain or it will be recovered back into the CIP makeup tanks.

**Challenges and solutions**

The client had a number of challenges with regards to the existing CIP system:

*Non-effective CIP*

The existing CIP system was not effective in terms of cleaning equipment to desired standards and as a result the client had lost money in the market due to products failing to comply with certain food safety standards. This was the major factor contributing towards the upgrade project.

*Excessive operating costs*

Apart from production time lost during plant CIP, there is a significant cost associated with running a CIP plant i.e., cost of chemicals, water bills, electrical bills etc. The old CIP system took longer as it was manually operated and the cost of chemicals was high as there was no recovery of CIP medium, everything was just going down the drain.

Generally, CIP process in a plant of this magnitude uses excessive amounts of water and consumes energy to heat it to the desired temperature. In addition, CIP chemicals are costly. The upgraded CIP is designed in such a way that CIP return from the equipment being cleaned can be recovered into the CIP tanks rather than going to drain, which is an additional benefit to the client. The upgraded CIP system is also fully automated, which makes it easy to use and it lessens plant downtime.

The upgraded CIP plant is equipped with high quality and reliable conductivity sensors that monitor all parameters during CIP make up and operation, therefore the equipment being cleaned is monitored to ensure effectiveness. The whole cleaning philosophy of the plant therefore evolved from being time-based on the old system to being effectiveness-based on the new one.

*CIP cross contamination*

Separation of CIP medium and product is very vital. The client had challenges in the past whereby these two mixed, which is also a quality compliance risk. To resolve the problem, the plant could only be cleaned on non-production days – mainly weekends.

The new design completely isolated CIP from production by the use of smart swing bend panels, which use inductive proximity sensors to detect port connections. The control system uses this information to manage all the relevant system interlocks to prevent cross contamination and most importantly, to ensure safety. This allows individual production plants to be cleaned independently during normal production days, without the possibility of getting CIP medium into other machinery that is in production mode.

**The benefits**

The primary goal of the project was to deliver an effective and efficient CIP solution. Therefore, throughout the commissioning phase and project signoff, the client’s quality department performed quality checks on every piece of equipment being cleaned, before and after CIP. The results came back positive, which proved that the new CIP system is effective and based on an efficient philosophy.

For more information contact Hybrid Automation, +27 31 573 2795, info@hybridautomation.co.za, www.hybridautomation.co.za
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Contact: jane@technews.co.za
Condition monitoring solutions from Turck Banner

Smart retrofit – update legacy plant maintenance strategies using customisable solutions based on smart sensors and secure wireless networks.

Are the motors for your hydraulic pumps in working order? Does your CNC machine need refilling with cooling lubricant? Is it currently the right temperature in your storage room? Personnel can now access this information from anywhere at any time. The high-performance technology behind this is quick and easy to retrofit and does not interfere with existing plant operations.

Enabling predictive maintenance with the DX80 wireless system

Instead of reacting to a failure at a later stage, or servicing components on a regular basis, maintenance personnel can now request information on the condition of machines and other equipment at any time. With effective real-time condition monitoring the requirements for a predictive maintenance strategy can be met, even on existing legacy systems.

Turck Banner’s retrofit solution can even be used in industrial plants that do not yet fully support sensor-based condition monitoring. Machines can easily be monitored by independent systems, with data transmitted via a wireless network if required. All the necessary devices are easy to install and set up.

The condition monitoring system combines sensor technology, wireless transmission and data analysis and runs autonomously without having any impact on operations in the plant. If required, it can also transfer the values to your own automation environment and you can view them there.

Wireless sensors can be easily installed in the field, often using a magnetic mount. If required, the devices in the DX80 wireless system can also be run on batteries. Not only does this reduce the time required for installation, it also enables operators to place sensors and transmission modules in areas that are difficult to access. It also allows retrofits without interfering with ongoing processes.

Control units and gateways allow the data to be used locally or remotely

How can this condition data be used? In a variety of ways: thresholds can be displayed using a tower light; machine data on a central HMI, or in the cloud; staff can receive information about irregularities automatically via SMS; or values can be transferred to the company's own automation environment.

Use data locally

In the machine environment, sensors monitor parameters such as vibration, temperature and humidity and by using ultrasound, they can even detect the filling level in oil tanks. Transmission modules of the proprietary DX80 wireless system send this data to an associated gateway. Then, via connection to the TX700 HMI control unit, maintenance engineers can view all the condition data in one place.

An Ethernet connection to the company network opens up even more possibilities, including monitoring via WebVisu, automated e-mail notifications or data integration into the company’s automation platform.

The journey to the cloud

The TCG20 gateway can also be used instead of the HMI control unit to process the sensor readings from the field. The gateway encrypts the data and sends it to the cloud via Wi-Fi or the cellular network. Users can choose between a locally hosted (on-premises) solution and a public cloud from which end devices anywhere in the world can retrieve data.

The gateway is able to carry out decentralised analysis of the data, but data can also be analysed in the cloud. Turck Banner’s industrial cloud allows users to create a personalised dashboard, view past trends and configure automated emails or SMS messages. The TCG20 gateway also supports the Amazon Web Services and Microsoft Azure cloud platforms.

Cloud-based remote machine maintenance in action

Special machine manufacturer Velco uses a remote monitoring solution based on Turck Banner Cloud Solutions for locating error sources and monitoring production parameters.
Velco special machines renew refractory concrete layers in steel and blast furnaces

Steelworks operators worldwide use Velco machines to spray their blast furnaces, ladles or channels with refractory concrete. This layer of special concrete is attacked by the slag and heat and has to be renewed regularly. Steelworks and blast furnace operators use a refractory concrete gunning machine for this, or outsource the refractory repairs to refractory material manufacturers and processors.

In order to provide rapid support for customers in the event of malfunctions, these specialised machines are provided with remote monitoring. As its previous solution could no longer meet the demanding requirements, Velco searched for a cloud-based solution that would allow worldwide remote access via PC or smartphone. After a selection process, it was Turck Banner’s solution that was chosen, as it was the only one that fulfilled all the requirements.

Avoiding excessive service callouts

“Our customers want to know whether their machines are working optimally or not and whether any problems are developing,” explains Klaus Küster, head of electrical engineering at Velco. “In order to meet these demands, our machines have to be equipped with remote monitoring and maintenance capabilities.”

Velco’s remote monitoring module was designed to eliminate excessive service callouts for accidently closed supply lines or the pressing of emergency pushbuttons and at the same time help with the troubleshooting of real malfunctions. Turck Banner Cloud Solutions stood out on account of its user-friendliness. “The key benefit is that we can access the controller of the machine directly via a PC or a smartphone,” adds Küster.

Dashboard provides a clear data overview

Velco uses its own design of the Turck Banner Cloud dashboard. Thanks to the responsive design functionality it can also be used optimally on tablets and smartphones. “Our customer’s employees call up the dashboard of the Velco cloud and see their machines listed in the navigation window,” elaborates Küster. “A view in Google Maps indicates the location of individual machines. Then, if an employee clicks on one of the entries in the list, the dashboard provides a clear overview of all the relevant data.”

Besides some analog values such as water pressure or material level, there are also digital indicators such as for operating state or the status of the emergency stop button. The user can also see an operating-hours counter and other numerical displays. The dashboard can be made up easily by the users themselves – with just a few clicks and without any programming knowledge. Users can also create their own alarm messages via SMS or email for different users.

Automatic material ordering possible

A welcome side effect of the cloud is that it provides transparency. Refractory concrete users, in particular, want to see how long a machine has been in operation. Depending on the contract, customers are required to purchase the special concrete of a particular manufacturer. If the consumption values for the concrete do not match the operating hours of the machine, the end customer can assume that other material was used. The cloud solution also opens up new sales models for refractory concrete manufacturers, as they are able to offer and invoice the service according to actual use.

Assigning individual user roles and rights

Many users consider the risks involved with remote control, as well as its benefits. From the beginning therefore, Turck Banner placed prime importance on data and communication security. The management of roles and rights enables the owner of the machine to determine which users can navigate in the cloud and with what authorisations. Different authorisation levels can be defined individually for each machine and user, from elementary read rights to write authorisation, right through to administrator rights. The communication between Turck Banner’s TCG20 cloud gateway and the cloud server is also encrypted via the Kolibri proprietary cloud protocol, which meets the latest standard for data transport in the web (TLS 1.3, AES256).

Mobile communication makes corporate network access unnecessary

Responsible IT managers seldom allow access to the corporate network, even when it uses encryption. With the Turck Banner solution, this is not a problem since the TCG20 can also establish the connection to the cloud via the mobile network. There is therefore always access to the machines regardless of where they are used and the financial investment for data communication via mobile networks is manageable. “We use normal country-specific SIM cards and everything works provided there is adequate network coverage,” concludes Küster. “The TCG20 is nevertheless also available with a Wi-Fi interface as well as a flexible combination device with Wi-Fi and mobile communication. Customers who wish to host their cloud on-premises often prefer to use the Wi-Fi option.”

Conclusion

The overview of the state of all machines is a real benefit for Velco and a strong sales argument compared to its competition. All OEMs would like to offer their customers a better product. With Velco, this is done through optimum remote access to its machines. The move to the cloud in conjunction with Turck Banner is a milestone on the company’s journey towards Industry 4.0.

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Temperature profiling in automobile manufacture

The automotive industry uses many materials to build cars, including metals, glass, polymers and rubber. These have evolved over time, becoming more sophisticated and they also often require heat treatment at some stage of component manufacture.

Air bags
For an air bag to function correctly, it must inflate quickly and efficiently. To aid this process, the nylon substrate of the material is coated with a low friction silicone layer. The silicone coating, as part of its application to the nylon substrate, goes through a critical thermal cure process. This is often performed in a stenter oven, where the fabric is passed through a convection oven with a very low height restriction. If the silicone is under-cured, there is a risk that the surfaces of the air bag will stick together, preventing correct inflation of the air bag. The solution:
• Using a customised Datapaq Oven Tracker system (Datapaq StenterPaq System), even this difficult varying width stenter oven can now be profiled quickly and safely.
• The system allows profiling at full process speed.
• No need for the system to sit on the material, so no risk of fabric damage or the profiler falling through the unsupported fabric.
• Repeatable thermocouple positioning across the fabric.
• Process profiling performed without downtime, maximising productivity and eliminating fabric burn.
• Uniform curing results in reduced rejects, scrap and their associated costs.
• Process traceability provides protection against costly liability and litigation issues.

Adhesives, sealants and mastics
During the paint cure process, a variety of complementary materials need to be either heat treated or cured. Many of these materials are essential to the safety of the car, so they are as important as the paint cure process and therefore, need to be profiled. High temperature structural adhesives are used to give structural strength to areas of the car that need it for side impact resistance and to achieve the safety specifications required. Adhesives are used, since there is no space for welding on B pillar flanges. Proper cure of sealants, mastic and sound deadening materials provide waterproofing/reduced road noise and prevent toxic engine gases from entering the car’s interior. Over curing can produce by-products that can affect the quality of other paint processes. The solution:
• Using a Datapaq Oven Tracker XL2 system, the correct heat treating of adhesives, as well as curing of sealants and mastics, can be assured. A standard Oven Tracker XL2 system (6- or 8-channel), with TB0090 thermal barrier is often used.
• Alternative systems (process dependent) include: OvenTrackerXL2 with dual interface (16-channel), and TB0083 thermal barrier; OvenTrackerXL2 Singlepass with long duration TB0081 barrier, for profiling all ovens in one run.
• With rework not an option in this industry, scrap costs resulting from the over curing of sealants are reduced.
• Passenger safety is improved and manufacturer liability issues relating to curing of the adhesive, are reduced.

Panel pressing
Hot forming is being increasingly adopted in the forming of structural panels for use in the production of automobiles. The key benefit is that very rigid structures can be made accurately with high strength lightweight steels. This ensures the car is both lightweight and strong, both of which are improvements required by legislation in many regions of the world. The process consists of the rapid heating of flat panels to 950°C prior to pressing them into complex shapes. Temperature uniformity of the panel prior to pressing is critical in ensuring correct forming of the product. The solution:
• The Datapaq system is used to measure the temperature uniformity of the panel through the fast heating process.
• The user can accurately measure the performance of this key process.
• The time to set up the process at each new product introduction is reduced, thus maximising production line utilisation rates.

Rubber
Natural rubber has some serious defects; it is weak, easily becomes sticky and is not very elastic. To improve the physical properties (strength and heat resistance) of the material, it is taken through a vulcanisation process. The polymeric chains of rubber undergo a cross-linking reaction, initiated by the addition of sulphur to form a stable 3D network. To increase the rate of the chemical reaction, heat is applied. Typically, a target cure schedule for the rubber is 180-200°C for two to three minutes. Measurement is very difficult, due to oven size restrictions. The solution:
• A low height, narrow thermal barrier enables Datapaq to provide a customised fit-for-purpose solution.
• Using a customised Q18 system, the user can guarantee the quality of the vulcanisation process with the desired cure schedule achieved.
• Multiple channels are available to measure oven and product temperature uniformity at different depths in the rubber.

Paint cure on bumpers
In general, profiles are performed on paint lines to measure paint cure quality on an intermittent basis – for example daily, weekly or monthly. The assumption the user makes is that the process is working correctly for the period between acceptable consecutive profile runs. Obviously the more frequent the profiles, the more confident the user will be that the process is constantly in control. The desired aim of any paint QA manager would be to have live profile data from the process at continuous intervals through each shift. The solution:
• A Datapaq system equipped with the optional TM21 radio telemetry functionality can provide real-time data from within the process.
• Ability to provide a profile system that could monitor every product cycle providing live product temperature data, via radio links, from the two coating oven lines, in real-time.
• The system continuously runs through the cure process loop, fully protected, constantly providing product temperature data from a sample bumper with thermocouples attached.
• A trial of the system in a serpentine oven showed that over 99% of all data was received over a 95 min cycle, thus proving reliability of data transmission and collection.
• A single PC and receiver can collect temperature data simultaneously from two separate Datapaq systems, running on separate bumper lines.
• Hardware only needs loading and unloading once per shift, reducing handling wear and tear on the system and the thermocouples.

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

The SensoTech LiquiSonic is an inline analytical system for determining the concentration of binary liquids directly in the production process. The analyser is mostly used for phase separation and reaction monitoring in refineries, with sensor installation within the product stream, thus meaning an extremely fast measurement that responds immediately to process changes for optimum control.

Motor fuel alkylation using liquid hydrofluoric (HF) or sulphuric (H$_2$SO$_4$) acids is a catalytic process used in petroleum refinery operations. The purpose of the alkylation is to improve fuel properties to achieve higher octane for lower emissions which is an important process in petrochemical alkylation operations.

While the H$_2$SO$_4$ alkylation scores points with safety and environmental protection aspects, the HF alkylation typically shows efficient acid recycling. Olefins and the isoalkanes from raw oil resulting from fluid catalytic cracking (FCC) constitute the starting materials. Together with HF and/or H$_2$SO$_4$ as catalyst, high-grade alkylates are formed. Due to their high-octane rating, few aromatic compounds and comparably environmentally friendly properties, they are perfectly suitable for petrol blending from both an economic and an ecologic point of view.

The most important requirement for the alkylation system is error-free operation to prevent e.g. an ‘acid runaway’, which can occur when the acid strength goes below 85-87%. In this case the reactions between the olefins and the iso-butane turn into reactions of olefins only, producing polymers known as acid sludge, red oil or ASO (acid soluble oil). To prevent this, control of the acid, water and ASO quantity is of particular importance.

Traditional sampling is potentially very dangerous, time intensive and the results only arrive after some hours of laboratory testing. Here the LiquiSonic scores points with immediate inline analysis and data recording as well as increased system productivity and safety. The robust LiquiSonic measuring technology has set benchmarks in 3-component analysis for years. Using select specialty materials, it effectively prevents corrosion, abrasion and drift, even under difficult conditions. The LiquiSonic immersion sensors can be easily installed directly into the pipeline and are ATEX-, IECEx- and FM-certified. Possible installation locations include upstream and downstream of the acid separator, and at the alkylate outlet of the iso stripper. Despite difficult, corrosive process conditions, utilising materials such as Hastelloy C-276 or Monel, long-term system stability is possible.

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Petroleum refinery alkylation process

Due to their high-octane rating, few aromatic compounds and comparably environmentally friendly properties, they are perfectly suitable for petrol blending from both an economic and an ecologic point of view.

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Safe operation of LNG tanks

Mastering the challenges of inventory management for liquified natural gas (LNG).

The rapidly increasing supply and demand for LNG is driving a new and dynamic business worldwide. The number of small to medium scale terminals is increasing, while at the same time, tank sizes are increasing in new-design centralised terminals. These developments bring complex challenges to the safe and efficient managing of LNG inventory in tanks, terminals or other storage facilities.

The storage of LNG at cryogenic temperatures presents unique challenges that must be appropriately handled to ensure safe and efficient operation. A typical LNG tank requires a wide range of instruments to measure liquid level, density, liquid and vapour pressure and temperature, skin temperature and more.

Additionally, stratification occurs when the product in the tanks forms layers with different densities and temperatures. For safe operation, users need to ensure that two layers of different densities are not rapidly mixing and releasing large amounts of gas, known as rollover.

Endress+Hauser’s innovative instrumentation and advanced inventory management solutions for LNG storage tanks ensure safe operation of plant and high levels of inventory transparency. These solutions offer a wide set of functionality and benefits, including:

- High precision servo tank gauging with the intelligent Proservo NMS8x for constant primary level measurement, or in redundant operation, to accurately and reliably monitor level. It performs density profiling as required.
- Separate servo or radar gauges for high level alarms ensure 24/7 plant safety.
- The safe operation of LNG tanks to ensure that different densities and temperatures do not create layers that could result in rollover effects. LTD (level temperature density) gauges monitor density changes in different LNG layers, creating a density and temperature profile of the tank.
- Highly accurate pressure transmitters provide alerts for any significant pressure changes in the LNG tanks and boil off gas management.
- Redundant inventory management system to ensure 24/7 plant availability.
- Stratification and rollover prediction software – not only important for knowing what is happening in the tank, but also helps you determine the next process actions.
- Skin temperature for cooldown and leak detection and temperature monitoring software.

The rollover prediction software within Tankvision allows users to visualise the evolution of temperature, density and layer thickness of the stratified layers within a tank. The software predicts rollover and enables upfront countermeasures. The change in boil-off rate and vapour pressure can also be visualised with time.

The cool down and leak detection sensors, located around the base sides and roof of the LNG tank, are used to detect any abnormalities in the shell insulation that may result in a leak of product. The software provides the following functionalities:

- View menu – skin temperatures.
- Temperature maps.
- Shell layer drop down selection.
- Historical skin temperatures.
- Thresholds/trends/alarms.

For more information contact Endress+Hauser South Africa, +27 11 262 8000, info.za.sc@endress.com, www.endress.com
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Endress+Hauser
People for Process Automation
New iTEMP transmitter with Bluetooth

Endress+Hauser’s new iTEMP TMT142B temperature transmitters deliver highly accurate and reliable measurements, wireless communication via Bluetooth and user-friendly operation packaged in a robust single-chamber field housing. The technology offers significant improvements in process efficiency and plant availability while, at the same time, reducing costs.

In industrial process engineering, temperature transmitters are an important link between temperature sensors in the process and the higher levels of automation. Measurement instruments are often installed in difficult to access locations, which frequently make it more difficult to commission, operate and service them.

To keep the effort for commissioning, device configuration and maintenance low, the transmitter features an integrated Bluetooth interface that enables users to wirelessly display measured and status values as well as to perform configuration tasks. The device is extremely easy and fast to operate using the Endress+Hauser SmartBlue app. Access to the device is password-protected and the Endress+Hauser security concept for Bluetooth communication complies with the highest security standards.

Clear process information in the field
The newly developed backlit display provides excellent readability under all environmental conditions, both in the dark and in strong sunlight. Diagnostic messages are indicated through variable backlight colour (white to red) and facilitate maintenance work in the field.

Highest reliability in critical processes
The conversion of different sensor signals into a stable, standardised output signal (4-20 mA) represents a challenge when it comes to industrial temperature measurement. Precision and long-term stability, particularly at critical measuring points, are crucial for safe and smooth process operations. The configurable single-channel device transmits converted signals from resistance sensors (RTD), thermocouples (TC), resistances and voltage transmitters (mV) via the 4-20 mA signal or the HART 7 communication.

The transmitter guarantees a high level of measuring point availability through integrated sensor monitoring functions and device diagnostics. The transmitter-sensor matching capability using the Callendar-Van Dusen coefficients further improves the entire system’s temperature measurement precision. The iTEMP TMT142B temperature transmitter is designed for safe operation in hazardous areas as certified by international approvals (ATEX, CSA C/US, IECEx).

For more information contact
Endress+Hauser South Africa,
+27 11 262 8000,
info.za.sc@endress.com,
www.endress.com

Conductivity sensor for CIP monitoring

The LDL200 from ifm electronic is designed to be used in cleaning processes (CIP) in the food industry. It detects the concentration of cleaning agents and checks the rinsing water for residues and for product validation.

Precise, fast and reliable measurements during the process help to improve plant availability and optimise cleaning cycles. The benefits are reduced amount of cleaning agents required, lower energy consumption and lower water consumption during rinsing, resulting in considerable cost savings. Other benefits include:

• Reduced inaccuracies associated with a time-based cleaning process.
• Improve process performance with flexible measurement points.
• Compact, high-quality sensor design prevents failures and unplanned downtime.

The device has proved popular because of its compact design and connection. Just one M12-connector is sufficient to provide loss-free data transfer of the conductivity and medium temperature values by IO-Link. Thanks to its high measurement dynamics the LDL200 accurately monitors if wash fluid is still in the pipe or if clean water is present. And because this is done so quickly you save on resources. In other words: the cleaning process is shortened and machine availability is increased.

Parameters can be set automatically using IO-Link. Applications are found in breweries, dairies and other food manufacturing plants.

For more information contact
Ifm – South Africa, +27 12 450 0400,
info.za@ifm.com,
www.ifm.com
Ultrasonic flowmeter for wide ranges

Instrotech has announced the release of Kobold’s new DUK flowmeters, for measuring, monitoring, metering and dosing of low viscosity fluids. Working on the principle of the difference in running times, (ultrasonic waves in a medium are influenced by the speed of flow), two sensors are mounted opposite one another in the pipeline function simultaneously as transmitter and receiver of ultrasound signals. If there is no flow, the running times of both signals are identical. If the medium is flowing, the running time of the signal against the flow is longer than that with the flow. The running time difference, determined by a microprocessor, is thus proportional to the speed of flow.

The devices can be equipped with a switching output, a frequency output or an analog output. In addition, a compact circuit can be selected that features a digital display, a switching output and an analog output. The device series is rounded off by an optionally available dosing and meter circuit. The meter circuit indicates the momentary flow rate in the first line of the display and the partial or total quantity in the second line. A dosing circuit controls simple filling tasks and similarly measures flow rates, total amounts and filling amounts. The analog output and two relay outputs can be used for further processing of the signals.

The electronics portfolio of the DUK all-rounder includes:

- Flowmeter and monitor – frequency/analog outputs along with various switching outputs.
- Compact electronics – digital display plus switching and analog output.
- Counter and dosing electronics – display of current flow rates as well as partial or total quantity; control of dosing applications with filling quantity and total quantity; additional analog and relay outputs for further signal processing.

For more information contact Instrotech, +27 10 595 1831, sales@instrotech.co.za, www.instrotech.co.za
Turck standardises its fluid portfolio

FS+ flow sensors combine innovative operation and robustness in an iF 2019 Design Award winning product.

Turck has developed a platform concept for its fluid sensor product portfolio. The devices offer a wide range of variants and combinations, while having common key features at the same time. The compact FS+ flow sensor with IO-Link now follows the market launch of the PS+ pressure sensor. This monitors flow as well as temperature and features practical Teach functions.

The devices don’t just have a similar appearance or carry the plus sign in their name. In future, Turck will be putting its entire fluid portfolio on a standard technology platform. Sensor users will therefore find many of the same product features and the standard handling concept in the entire series. The modular and freely configurable mechanical concept, shorter delivery times and easier stock management are additional benefits.

The sensor head is the characteristic feature of the compact sensors. This consists of a stainless steel housing and a single-piece translucent front cap. Thanks to the reduced sealing area, humidity and dust cannot penetrate inside the devices, while UV and salt spray-resistant materials offer special protection in outdoor applications. The sealing concept enables protection types IP6K6K, IP6K7 as well as IP6K9K, since the sensors no longer have any mechanical operating elements. Instead, users navigate functions like on a smartphone via wear-free, capacitive touchpads.

One sensor for two queries

The new FS+ incorporates a proven technical design. It monitors fluid media according to the calorimetric principle and therefore offers the possibility to constantly measure the media temperature as well as the flow rate. This means that a single sensor can handle two tasks at the same time. Typical application fields include, for example, cooling circuits in welding applications or cleaning processes, in which the process sequence is controlled.

In the FS100 product series, users first have the choice between two different output functions: Either analog (4-20 mA) or as a transistor with automatic PNP/NPN detection and communication via IO-Link. The switching behaviour can be set between normally open (NO) and normally closed (NC). LED indication that is visible from all sides indicates the state of the outputs, while a bicolour LED strip on the user interface indicates either flow or temperature values.

The FS+ is likewise easy to mount and operate. The probe tip can be aligned as required in the medium and the sensor will operate within its specifications. Irrespective of this, the sensor housing can also be rotated around 340 degrees to align the display and electrical connection to convenient positions.

Setting reference values with Quick Teach

The FS+ offers some practical handling features such as a lock mechanism or the ability to reset the sensor to the previous settings (Undo function), as well as to the factory settings. Two modes are provided for teaching switch points: The Quick Teach function enables users to define a reference flow rate in only a few minutes and set the monitoring of deviations directly on the sensor. Alternatively, maximum and minimum values can also be defined in the application. The innovative Delta Flow monitoring function, which only activates all teach functions if a constant flow has been reached, provides significant assistance. The internal compensation function means changes in media temperature have no effect on the flow measurement.

Outlook

The fluid sensor portfolio will expand even further in future. Based on the platform concept, compact sensors for temperature and level measurement will follow in the generation of plus sensors – easy to integrate, robust and with a functional design.

For more information contact Turck Banner, +27 11 453 2468, sales@turckbanner.co.za, www.turckbanner.co.za
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Clip-on indicator with Bluetooth and logging

WIKA has introduced the new PR 4512 clip-on, Bluetooth-enabled data logging and configuration tool for all PR 4000 and 9000 devices. Monitor live process values and diagnostic information on any IOS/Android device running the free PPS application – or monitor directly on the PR 4512 display.

Advanced data logging is available, including time stamped events utilising the built-in real-time clock. With its 100 MB onboard memory, the PR 4512 can log more than 2,75 million data points. For example, users can record 30 days of process data at one-second intervals, which is perfect for preventive maintenance.

While on-site, easily analyse real-time process data by uploading it to an IOS or Android device. Off-site, users can view their data in .csv format for convenient analysis on a PC.

For more information contact WIKA Instruments, +27 11 621 0000, sales.za@wika.com, www.wika.co.za

Best practices in measurement

What cannot be or is not measured, cannot be improved. Any data-driven approach for continuous improvement in manufacturing requires definition and ongoing tracking and reporting of key performance indicators (KPIs) against targets. This is as relevant in the boardroom as it is on the shop floor. What is the point in providing the tools and applications to steward manufacturing operations conformance against targets and constraints if the basic means aren’t in place to measure the operation in the first place?

Changing times: what was fit-for-purpose then may no longer be now

Many facilities were built at a point in time – some as far back as the 70s and 80s – for a particular process, a certain level of control and a certain suite of optimisation applications. Roll on to today where the world is grappling with the impacts of the COVID-19 pandemic. These facilities are now being operated and maintained at skeleton staffing levels and are being retooled for different services than were originally intended.

Operating envelopes are changing and the impact of these changes on instrumentation must not be underestimated. Instrumentation with a design rating of a particular flow rate or capacity is heavily stressed when the service or load is increased. In some cases, the instrumentation for the original service is unsuitable for the new service and needs to be swapped.

Some fine and specialty chemicals manufacturers may be dosing new chemicals into flowlines for enhanced process efficiency. For legacy instrumentation this can be a real issue as it affects the instrumentation resulting in periods of time when the plant is subject to sub-par control. This can impact plant safety and reliability, as well as profitability.

Key plant measurement considerations

Situational awareness forms the basis of effective decision-making in process facilities. The foundation for situational awareness is the plant data itself, gathered from the various devices on the front line. With context and relationship, plant process data measurements constitute information. Increasing context, connectedness, patterns/relationships and the understanding thereof, can then lead to knowledge and insight. This is fundamental to effective decision-making in plant operations, which is made easier through data analytics, which itself is under-pinned by the quality of the fundamental plant data. Only with robust plant data can the true potential of analytics be realised.

Three decisions to take today

1. Undertake a Value Of Information (VOA) audit
   Knowledge and information are useless unless you are going to do something with it. While an excess of process data presents many opportunities, it can also paralyse an organisation and hinder speed of decision-making. Evaluate the key value drivers of the plant, assess which plant data and information is required to create value and then inventory the key instrumentation needed to ensure value creation can be sustained.

2. Instrumentation-related Management of Change (MoC) processes and procedures
   Quality measurements must be maintained when switching between plant production levels or product line batches, as these stress instrumentation devices in different ways. Assign responsibility to an individual within the instrumentation discipline to work with operations for creating or updating formal Management of Change processes for key plant measurement/data considerations. Based on this, establish a fleet-wide measurement device monitoring and assurance program. A fleet-wide system for tracking and reporting performance, as well as ensuring compliance, is a necessary first step to operational improvement.

3. Operations staff re-deployment
   Where unit operations have been turned down, or temporarily shut, can those operators be redeployed to support elsewhere in the plant? For example, regular and accurate pressure measurements and flowrates at either end of impulse lines on distillation columns are vital for a reasonably accurate mass balance to be achieved in order to match models to plant data. After all, many analytics and rigorous dynamic models use online measurements from the plant to provide information about the status of the plant that cannot be directly measured, can predict the future trajectory of the plant and advise the operators on action required to keep the plant within its operating window and at its optimum operating point. However, accessing these measurement locations isn’t always straightforward. Downtime of operations staff could be utilised to find sustainable solutions for these challenges for when operations ramp up again i.e. finding new ways to retrofit, upgrade or maintain measurements across the plant.

For more information contact Yokogawa South Africa, +27 11 831 6300, eugene.podde@ao.yokogawa.com, www.yokogawa.com/za
Level switch with float

Instrotech now offers Kobold's M-series level switch comprising a float that slides up and down with the liquid, along a guide tube. Thus, up to four reed contacts moulded in the guide tube are switched in a non-contacting fashion by a ring magnet encapsulated in the float. The hermetically sealed contacts are available as normally closed, normally open or changeover versions. In this way, many simple tasks such as automatic signalling of empty/full tanks and automatic tank filling can be performed by a control relay.

Brass, stainless steel, PP, PVC, NBR and PVDF are available as a choice of materials, practically ensuring measurement of almost all media. The maximum medium temperature is 150°C and the maximum pressure is 100 bar. Guide tube lengths from 40 mm to 6000 mm are possible, which can be installed on a vessel top via flange or thread connection.

Depending on the float type, these level switches can be used for mediums having density as low as 0.5 kg/dm³. A compact design with small float diameters (starting from 18 mm) allows installation of these switches in containers with limited space. When top installation is not possible, the alternative model MS switch, suitable for side mounting, is recommended and operates exactly as described above. Other benefits include:

• Simple installation.
• Long electrical service life due to sealed contacts.
• High degree of operational reliability with air gap between guide tube and floats.
• Installation in the top or the bottom of a vessel.
• Several levels can be monitored with one float.
• Open/close function or changeover contact available.

For more information contact Instrotech,
+27 10 595 1831, sales@instrotech.co.za, www.instrotech.co.za

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Part of your business
Ceramic and metallic measuring cells optimise additive production at BASF

There is a small but important building block at BASF’s highly efficient Swiss production site in Kaisten. It is a guarantee that all processes are completely free of silicone oil. This is why traditional differential pressure transmitters can reach their limits when monitoring the levels during the production of additives for paints and plastics. They work by means of capillary lines filled with silicone oil, which – in the unlikely event of an accident – could come into contact with the medium. In contrast, VEGA electronic differential pressure measuring systems provide additional safety through the innovative combination of ceramic and metallic measuring cells.

Plastics today can be colourfast and elastic, crystal clear, high gloss, abrasion-resistant or even heat-resistant, thanks to a variety of special additives. The vapour pressure of liquids plays a decisive role in the production of such additives. Their precise measurement not only contributes to BASF’s highly efficient control of special processes, but also provides additional information on how process components can be optimised and plant availability increased.

Silicone oil-free measurement

While conventional differential pressure transmitters were previously used for level measurement, BASF’s measurement and control engineers in Kaisten have now decided to replace their instrumentation. They have switched their process control over to electronic differential pressure, which is silicone oil-free, without capillary lines and therefore without mechanical pressure diaphragms. Thanks to the ceramic measuring cell, this system is ideal for vacuum and high temperatures. “The decision for electronic differential pressure on the basis of ceramic Certec measuring cells was obvious, in view of their reliability in withstanding abrasive substances,” emphasises Markus Stoll, BASF’s head of Specialist Workshops. “Our plant is completely automated and operates 24 hours a day, 7 days a week.”

One system for two extremes

The highly robust ceramic Certec measuring cell was ideal for the perfectly flush application in hot, aggressive solvents in the lower reactor section of the BASF vacuum reactor. In the upper reactor area, however, completely different conditions prevailed: here, the extreme steam caused condensation in the measuring cell and led to inaccuracies. Initially, the obvious solution was to use the differential pressure system based on metallic Metec measuring cells. Condensate and humidity no longer had any negative influence. “The upper measured value remained acceptable and highly accurate in all situations,” recalls Stoll. “However, the high temperature of the solvent in the lower reactor area repeatedly caused measured value drifts.”

Dream team for heat and condensate

It took expertise, willingness to experiment and above all, close cooperation between BASF’s Measuring and Control Technology department and Jürgen Feser, the key account manager at VEGA, until everything was running smoothly. The surprising solution was to use an innovative electronic differential pressure measurement system with a combination of a ceramic and a metallic measuring cell.

Both pressure transmitters record their respective values separately and calculate the differential in the master sensor. This is made possible by structurally identical instrument electronics behind the two very different measuring cells. They work perfectly, even in a mixed team. “For our application, this combination is a real dream team,” says Stoll with satisfaction. “As far as I know, only VEGA offers this combination capability. The bottom line result is one solution for two challenges: the ceramic measuring cell easily handles the high temperatures and aggressive substances in the lower reactor area (HP side). In the upper part, or LP side, the metallic measuring cell performs perfectly in the presence of condensation.”

Conclusion

Even the most ingenious manufacturing process for additives is only as good as the equipment of the production plant. In the case of BASF’s distillation reactors in Kaisten, the sensors of the pressure transmitters really get the job done, even in the most inhospitable locations. The combination of a ceramic Certec and a metallic Metec measuring cell has proved to be the perfect combination from VEGA.

For more information contact VEGA Controls SA, +27 11 795 3249, leandi.hendrikse@vega.com, www.vega.com
New RTD transmitter

Inor’s new Apaq 130 is a modern transmitter with high reliability and great performance. External influences such as ambient temperature, vibration, moisture and EMC interference have minimal influence on the measurement result, thanks to the robust design.

What characterises the APAQ 130 is simplicity. Users can easily configure the transmitters wirelessly with a smartphone or tablet. There is no need for expensive configuration tools or fixed workstations for transmitter configuration.

Great performance at an attractive price makes this transmitter an excellent choice. What stands out is its compact design. The head-mounted variant is only 10.5 mm high and can easily be installed in all DIN B connection heads. The rail mounted variant is only 6.3 mm wide, allowing users to save valuable space in the cabinet.

Quality and control
The APAQ 130 is built on Inor’s latest transmitter platform to leverage efficiencies and to meet the customer’s need for digitalisation. By building on an already established and well-proven platform, ensures that the transmitters meet all relevant quality standards.

In the Inor Connect app, users can easily save and share configurations with colleagues. They can also generate configuration protocols in PDF format for easy documentation.

In PDF format for easy documentation. Configuring a transmitter has never been easier.

For more information contact Mecosa, +27 11 257 6100, measure@mecosa.co.za, www.mecosa.co.za

Detect compressed air, steam, gas and vacuum leaks

Comtest has introduced the Fluke ii900, a handheld sonic industrial imager that enables maintenance to quickly locate air, steam, gas and vacuum leaks in compressed air systems. The straightforward, intuitive interface allows technicians to isolate the sound frequency of the leak to filter out background noise. In a matter of hours, the team can inspect the entire plant, even during peak operations.

Using SoundSight technology, this industrial imager offers a new way to locate issues using sound. Leak identification is simple. A SoundMap is displayed in colour over a visual image of the equipment allowing for fast visual location. With the visual image, it is easy to scan a large area quickly and even identify leaks from a distance.

The Fluke ii900 finds application in the following industries: automotive, glass, cement, chemicals, food and beverage, pulp and paper. The ii900 enables users to do more with existing air compressors, for example:

• Delays the capital expense of purchasing an additional compressor.
• Ensures proper air pressure to pneumatic equipment.
• Lowers energy costs (optimisation of compressed air budget).
• Reduces leak detection time.
• Improves reliability on the production line.

The ii900 makes leak detection part of a typical maintenance routine, for example, the training of a maintenance team is possible in a matter of minutes and provides for the validation of repairs.

Finally, the ii900 is specifically designed for industrial maintenance teams, maintenance leads, plant maintenance managers and plant operations managers, who rely on compressed air, gas or vacuum in their routine operations. With minimal training, technicians can begin checking for air leaks as part of their typical maintenance routine. The ii900 means a better, quicker, simpler way to check compressed air leaks and at the same time conduct gas and vacuum leak identification.

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

Emerson’s AMS Wireless Vibration Monitor is a low-cost, easy to deploy vibration sensor that performs prescriptive analytics on vibration data using native software to automatically identify failure modes and prevent potential problems involving rotating assets. The new compact device makes it economically feasible to fully monitor motors, pumps, fans and other critical plant equipment to reduce downtime and achieve more reliable operations.

Many organisations lack the analysis expertise to translate vibration data into asset health. The AMS Wireless Vibration Monitor provides a solution by collecting and contextualising vibration data to generate actionable information. By applying Emerson’s patented PeakVue Plus technology, the device not only identifies when and how assets will fail, but also why. Technicians – regardless of expertise – can quickly and clearly identify and prioritise common mechanical issues such as bearing defects, gear wear, under-lubrication and pump cavitation, enabling them to focus more on operations-critical tasks.

“Thanks to the embedded prescriptive analytics, plant managers can add wireless vibration monitoring to their maintenance toolbox without having to train current staff to perform complex analysis,” said Robert Skeirik, director of machinery health solutions product management with Emerson’s Automation Solutions business.

Users of Emerson’s Plantweb Optics asset performance platform can conveniently receive machinery health alerts anywhere with a mobile device. These alerts can also be aggregated with data and asset health information from other sensors and systems, allowing users to run analytics on all types of assets from a single application. This provides a more complete picture of the operation’s overall health while generating specific alerts when processes or performance are at risk. Plantweb Optics is part of Emerson’s Plantweb digital ecosystem, which leverages IIoT technologies, software and services to expand digital intelligence throughout a workforce.

The AMS Wireless Vibration Monitor operates on a plant’s existing WirelessHART network and fully supports the vibration analysis tools included in Emerson’s AMS Machine Works software. It uses a triaxial sensor to capture data in three dimensions to generate a complete picture of the machine condition.

The AMS Wireless Vibration Monitor is the latest addition to Emerson’s comprehensive health monitoring portfolio, which includes the AMS Asset Monitor and AMS 6500 ATG. Together, these devices help organisations fully monitor the health of machinery equipment, from essential assets to operations-critical assets that can have immediate impact on safety and production.

For more information contact Emerson Automation Solutions, +27 11 451 3700, emrsouthafrica@emerson.com, www.emerson.com

Pump control at a distance

The ability to control a pump remotely over distance and without using wires is simple using Omniflex Teleterm Radio RTUs over a licence free band, avoiding administration of radio frequency band use. Easily customisable to suit any application means users can be up and running in hours. Using the preconfigured templates simplifies implementation even on more complex systems.

A PLC and radio in the same unit

A system can comprise two or more Teleterm Radio RTUs each in a weatherproof housing with a built-in PSU and standby batteries; one housing at the remote control end with all the I/O dedicated to control inputs and pump feedback status, and another at the pump side with all the I/O dedicated to control outputs and pump feedback inputs. The built-in radio allows up to 20 km line of sight between two sets of controls. This allows easy plug-and-play functionality with only the wiring of the power supply and the control circuits required. A touch screen HMI (fully customisable) can be provided to do the control of the pump and to visualise the pumps/system statuses, eliminating wiring of switches and bulld eye lamps. The on-board Ethernet port also allows connection to an existing scada system thus saving on additional hardware. The system has the following key features:

• Programmable Teleterm units in PLC language IEC61131 for local automation.
• Touch screen interface for visualisation and any manual user controls.
• Instant status of any outstations at a control point: no polling is required, the system reports by exception i.e. change of state triggers data transmission to optimise the radio bandwidth and thus performance.
• No radio protocol programming is required: simple configuration of data queries and subscriptions.

• Easy installation.

These benefits make it ideally suited for any remote control pump operation with the flexibility to customise the system for even complex controls like pump rotation and usage/efficiency statistics.

For more information contact Ian Loudon, Omniflex, +27 31 207 7466, sales@omniflex.com, www.omniflex.com
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The Eight Commandments to digitising your shop floor workforce

By Vinesh Maharaj, smart manufacturing lead for PwC South Africa.

The Eight Commandments to digitising your shop floor workforce bundle insights, examples and lessons learned from PwC’s experience in digital transformation in an operations and supply chain environment into eight practical ‘commandments’. Operations, production and supply chain leaders can apply this knowledge to digitising and connecting their workforce through wearable technologies.

Connectivity has moved beyond the use of mobile phones alone, with the emergence of a host of new technologies such as augmented and virtual reality. Connecting your workforce with smart technologies in an operational context has enormous benefits, for example, by interacting with a digital environment in a realistic way, quality, compliance, production and logistic efficiency can be increased, as can the self-learning and training opportunities that enable the workforce to adapt to its changing environment.

The Eight Commandments

1. Bring consumer reality into the realm of industry
In addition to being used by consumers, smart devices can also be used in operations on the shop floor. This naturally renders the industrial environment paperless, is easy to manage and gives staff a consistent and familiar user environment.

2. Select the right challenges
Your workforce is facing new challenges, from increased machinery and product complexity to changing safety regulations and circumstances. It’s crucial to consider these challenges and select the most important ones to address or overcome during your digital transformation.

As the need for digitally skilled people increases, so does the need for companies to invest in training programmes for digital concepts and capabilities and in finding new ways to attract talent. Your ‘workforce of the future’ will work with state-of-the-art technology, so the required skill set will shift accordingly. Creativity, adaptability, problem solving, leadership and innovation are the top skills for both blue and white-collar jobs.

3. Place your workforce at the centre
Industrial leaders see the biggest potential for digitisation on the shop floor. Companies need to think about how they can connect their workers with the equipment, information and processes they handle on a daily basis. There are various wearable devices and software options available that can help you achieve this.

For instance, if you give an operator a wearable with applications that contain digital and dynamic versions of their work instructions, they’d have access to all relevant processes and thus be able to complete the task at hand correctly the first time, faster and more effectively.

However, this connection is not limited to processes. There’s a growing number of resources available that can enable your company to connect the workforce with the assets and environment in which they operate. These provide workers with internal information from internal sources such as asset, ERP and other data, as well as external sources. The increasing generation of data and therefore information, by new assets and technologies, will only further increase the opportunity and urgency to connect your workforce with these sources of information.

Connecting your workforce by location alone already presents many opportunities for safety and quality assurance. For instance, the location information of an operator can allow or prohibit them to access specific areas or execute certain tasks. In case of a hazardous situation or emergency in an industrial environment, all internal employees and contractors can be traced and evacuated.

Also including additional static information in the connection, such as real-time performance data, manuals and routes, supports the workforce in its tasks and assures better compliance with safety, quality and operational procedures. For instance, providing the operator with a machine’s oil temperature may help them make a better and faster decision on specific preventive maintenance needs. Another example would be remote engineering support via communication by data exchange, call, or video.

Connecting your workforce with these various sources and utilising one or more connectivity levels across different applications can have a significant impact on your company’s overall performance.

4. Weigh your options smartly
There are many possibilities in using augmented reality and virtual reality, depending on the degree of reality augmentation you require and the mobility of the workforce. You need to consider the specific environment and application when choosing the optimal type of reality and associated hardware.

5. Let the voice of your workforce lead you through your transformation
To guide your workers through the digital transformation process successfully, it’s important to involve them from the very beginning. First, you need to learn how your workers operate within their environment before you consider a new and better solution.

This approach enables you not only to define a connected worker strategy and choose the right innovative technologies, but also to imagine the future of your connected workers. Getting out into the field to talk with and observe your operators performing real tasks on the work floor is the most powerful and valuable way to define the challenges and pain points that need to be addressed. It’s amazing what you can learn by spending time on the floor.

Implementing a connected worker strategy is a powerful component in a digital transformation process. By easily connecting your workers to their colleagues and giving them the correct information at the right time in the easiest possible way, you can make operational processes more efficient and productive than ever. Only by systematically involving your workers throughout the whole transformation process is it possible to implement real and valuable solutions on the work floor. Solutions that are easily accepted by your workers will ultimately become the new and natural ways of working.

6. Select the most promising operational area to start your journey
Connecting your workers with the use of smart wearables offers a wide range of opportunities. However, it also requires specific software and customisation for both workers and the organisation. Therefore, it’s important to assess the impact of the changes on the area of operations you’re considering and ensure the correct funnelling and selection procedures are in place.
The scope shouldn’t be limited to manufacturing and maintenance but should also include logistics: consider smart wearables for digitising procedures and switching to smart paperless warehouses. Connectivity allows team leads to monitor real-time performance, enabling them to proactively deal with potential problems or bottlenecks in day-to-day operations. It enables them to gather a great deal of data on daily activities and in turn, use that data to gain insights that can be applied to further robotics and automation initiatives.

7. Connecting your workforce is the means to an end: unlocking the data

Smart devices need a lot of data input and connections, but at the same time they’re tremendous generators of data. You should therefore consider your smart devices as important elements in the transition to a smart factory, where the data will be used for widespread analyses.

You need to consider which data is available or required for other smart factory opportunities and how this data can be used or generated in future. Smart devices aren’t standalone solutions and should be integrated into the broader digital system. The more tools, sensors and technologies can interact and exchange data, the higher the efficiency gains and therefore return on investment. As with many technologies, data analytics is both an enabler as well as an incentive for achieving the full potential of smart devices.

With the increasing availability of data from all types of sources, analytics platforms and dashboards are increasingly widespread and applied in domains such as commercial excellence, operations, logistics, energy and procurement. With smart glasses, the end user has hands-free access to these dashboards and their data insights. The smart device user can also receive tasks to be completed, triggered by analytics platforms or enterprise systems.

With the increasing use of analytics comes the need to connect and integrate as many data sources as possible. By using wearables as instruments during the execution of procedures, data registrations are not only stored digitally, but can also be fed into data analytics platforms. For instance, equipment parameters such as oil temperature and pressure can be included in a broader analytics platform that helps predict maintenance needs.

8. A small step for your workforce can be a big step in your digital transformation

Smart devices can be used for a wide range of applications. However, they shouldn’t be introduced as an isolated implementation, but launched as part of a bigger digital journey with the right vision, scope, communication and ecosystem of partners, suppliers and customers.

They can be highly beneficial in developing a larger digital programme in which business and technology viewpoints are combined with a hands-on experience perspective during short co-creation sessions. Cross-functional teams and stakeholders define business challenges while gaining technology insights, resulting in the identification of new opportunities and providing a clear view on the company’s current digital maturity.

As with every change and transformation, picking low-hanging fruit and showing tangible results and impact are key success factors. Therefore, it’s important to start with small pilots and scale quickly in terms of digital applications. The connected worker is a pilot case that can be implemented at relatively low cost and effort. Tackle a specific improvement opportunity, such as increasing efficiency and quality compliance, by digitising a standard operating procedure.

Conclusion

Your operators are facing numerous challenges, ranging from tightening safety regulations and ageing equipment to increased product complexity. This requires continuously evolving knowledge and skills from their side and therefore, support is needed. Support can be provided by connecting the workforce with their daily processes via manuals, digital procedures or human assistance.

The opportunities for applying digital procedures and assistance for your workforce are countless. However, it is risky to dive into the most obvious application without applying the Eight Commandments.

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Making Machine-as-a-Service a reality

Thanks to the rise of the IIoT, a new business model has emerged: Machine-as-a-Service. This not only introduced new revenue streams for machine builders, but also gave them a way to verify the feasibility of their new technology in specific applications before charging customers. It also increased business by allowing customers to rent instead of buying machines outright, which may have been cost-prohibitive. For example, Rolls-Royce’s engines are no longer sold to customers. Instead, customers are charged for hourly power generation and more comprehensive maintenance services.

Machine-as-a-Service also has machine builders focusing more on the ‘service’ aspect. By adding IIoT-connected sensors to machines, operational data can be sent to the cloud for big data analysis. This makes improved services such as predictive maintenance and remote maintenance possible. Predictive maintenance ensures smooth, uninterrupted operations by planning and performing maintenance in advance before a breakdown causes unexpected downtime. Remote maintenance not only reduces maintenance costs by reducing site visits, but also allows for faster resolution of issues that may arise. But in order to perform any of these services, secure remote access to machines is required.

Centralised platforms to the rescue
Fortunately, with recent developments in IoT and cloud platform technology, the issues that plagued these traditional solutions can be solved. Instead of managing individual VPN tunnels, you can use IoT technology to build a centralised platform that can monitor and manage all of your connections. Machine builders can manage all of their remote machines scattered across various locations by using web-based software running on a cloud platform. By using cloud-based software, machine builders can easily access their machines anytime, anywhere. They can choose which sites need to be connected and the connections can be automatically set up to link the machine builders to their client’s machines. This greatly simplifies the tedious burden of configuring and organising VPN connection settings for every remote connection, dramatically reducing maintenance and IT personnel costs.

Currently, there are few manufacturers with industrial-grade hardware and software integration capabilities. Selecting the right partner can be crucial for machine builders that need to manage thousands of connected devices. An experienced partner can provide machine builders with an easily scalable way to create secure connections between humans and machines, making remote maintenance and Machine-as-a-Service possible.

For more information contact RJ Connect, +27 11 781 0777, info@rjconnect.co.za, www.rjconnect.co.za
Siemens and J&K Technology have announced the development of the new CVal software solution for Comos. CVal is a digital process and plant validation software for use in the pharmaceutical industry, based on the Siemens Comos Plant Engineering software solution. This involves a wide range of different modules based on the Comos platform and the Comos Data Document Management System (DDMS).

Companies in the pharmaceutical industry have to ensure that their activities comply with regulatory requirements such as the Good Manufacturing Practice (GMP) – Annex 15: Qualification and Validation, constantly. Quality assurance guidelines had already been adapted in this field in 2015. The Siemens Comos software has been successfully used for engineering and life cycle processes in regulated industries for decades.

The new CVal software extension links data from the documentation system to the Comos engineering system. This creates a digital object-based life cycle management, which ensures both data integrity and traceability. CVal can easily be extended by other Comos software solution modules, to produce efficient life cycle management processes within an application.

The solution provides efficient data handling across a range of disciplines due to its central database and object-oriented approach. This offers the possibility to build digital twins. CVal is based on the digital twin of the plant available in Comos. The data for the various CVal modules can be generated directly on the relevant equipment or in existing libraries based on each object.

The Comos object orientation allows data to be linked within itself and with other plant equipment to provide the correct information where it is actually required. Errors, such as those produced by manual data entry or matching interfaces, can thus be prevented to the benefit of all the disciplines involved in a plant, such as engineering, operations and compliance.

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Providing effective automatic identification solutions requires more than just one technology. Three technologies, one philosophy: customer needs come first. A customer-recognised pioneer in industrial code reading and RFID, and in connectivity and big data, our global technology experts are wherever in the world you are. To meet your everyday challenges, it takes more than a vision. We find intelligence is what truly makes the difference.
Automation is a key factor in ensuring that a plant is able to achieve a high level of productivity. However, implementing automated processes in a plant requires suitable tools and components. Reliable sensors are among the most important of these tools. For example, sensors help to monitor processes, detect and pass on information regarding errors and control process flows.

To enable customers to use Pepperl+Fuchs sensors in explosion-protected areas, the company has made a range of selected factory automation sensors suitable for use in Zone 1 or 21 and 2 or 22.

Digitalisation as the basis for automation

The digitalisation of process information is vital to enabling the implementation of automated processes. Only by digitally processing information can we remotely monitor status, carry out measurements and check maintenance documentation. Supporting devices, such as sensors from Pepperl+Fuchs, are used to digitise analog information and signals. These devices record, analyse and convert the process information, then use a suitable interface to pass this information on to a central control interface. Technology that has long been considered standard in factory automation is now gradually making its way into process automation and therefore explosion-protected areas as well. Sensors used in these areas should be capable of simplifying sensitive process flows and increasing safety. Mechanical integration of sensors should therefore be simplified and standardised wherever possible.

Automation of the process industry

Advancements in the automation of process plants have resulted in changes to customer requirements. It is becoming increasingly common for plants to be networked and automated, which subsequently increases the complexity of explosion protection. The complex requirements for explosion protection are not due to changes to processes in particular, but rather they are due to the changes in technical capabilities in general. In turn, this means that approaches to problem solving are constantly changing, thus increasing the need for solutions that use tried-and-tested industrial sensor technology, including for explosion protection. One thing that is clear is that sensors that increase the productivity and safety of plants in factory automation can also be used in process automation. This results in increased customer demand for hazardous areas requirements that can be met using sensor technology. Difficulties implementing this technology are often due to the significant purchase and maintenance costs of sensors and especially the complex approvals and certifications required for explosion protection. Customers often want sensors to be fitted in potentially hazardous locations, posing even greater challenges. Based on this premise, our engineers have developed the ideal solution for optimising customer processes.

This is demonstrated by a project undertaken with a manufacturer of fall protection systems for filling tankers with liquids. Fall protection systems are necessary because the process of filling tankers with liquid chemicals is not fully automated; instead it is always carried out by workers on a platform. This means that one wrong decision by an individual can have far-reaching consequences for people and the environment.

Pepperl+Fuchs helped these customers to implement the existing process for non-hazardous areas in hazardous areas. During this process, the R2000 2D lidar scanner monitors the position of the fall protection device. The scanner is mounted under the platform railing and scans the area below the device. Before the filling process, if the personnel lower the lifting platform too close to the tank carriage below, the scanner triggers a dual warning signal – a flashing light and audible signal. In addition, the movement of the platform is automatically stopped to allow the personnel to react and use the controls to move the lifting platform into the right position. This eliminates the risk of damage to lifting platforms and railings and even eliminates the risk of crashes, which often result in injury to personnel. This process was implemented in hazardous areas by housing the scanner in an Ex d aluminium housing with an integrated viewing window. The scanner is installed in the housing at a 15° angle to prevent refraction from scattering and distorting signals. This guarantees that the scanner is fully functional. The solution was approved for hazardous zones 1, 2, 21 and 22. This solution allowed the customer to maintain existing structures on the plant and in turn, enabled its customers to safely monitor the filling process for chemical substances, even in hazardous areas.

Versatile applications for sensors in hazardous areas

The use of sensor technology is becoming increasingly common, even in harsh environments such as oil platforms. An example of this is an oil platform in Malaysia.

September 2020 www.instrumentation.co.za
Extronics has announced the launch of its new iTAG X30, which brings together years of development experience to deliver a true sitewide real-time location system (RTLS) solution for process industry environments. CEO John Hartley shared his thoughts: “We have worked very closely with our customers over the past 15 years and listened to the challenges they face. With worker safety becoming an ever-increasing focus for many businesses operating within process industries, we wanted to deliver a solution that allows our customers to achieve high levels of location accuracy across their entire site, without the need for dense Wi-Fi infrastructure in open areas. The iTAG X30 delivers upon that goal and we are excited to see it come to market.”

Process industries have a range of variable physical environments and complex operational challenges to overcome. It is unlikely that any one location technology ticks all of the boxes and there is no silver bullet. The iTAG X30 brings together GPS, BLE, LF and Wi-Fi into a compact tag, providing a practical solution to the complexities of the use cases found in process industries:

• Deliver wider coverage with reduced infrastructure.
• Add greater accuracy in certain areas.
• Provide additional functionality.
• Reduce total cost of ownership.

“The iTAG X30 meets the needs of the modern processing site,” concludes product manager, Becky Reeves, “Extronics specialises in developing and manufacturing ATEX, IECEx and North American certified equipment for use in hazardous areas. The iTAG X30 represents the next evolution in our RTLS product range, providing a practical solution for true site-wide location tracking.”

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Real-time location system

To increase safety for its employees, the oil company was searching for a solution that was capable of enforcing access restrictions for critical areas and documenting employee locations. Pepperl+Fuchs developed a solution by working together with a tracking software company that specialises in this type of application. The software is visualised using a human machine interface (HMI) device that is connected to the central computer. Persons are recorded by a radio frequency identification (RFID) system, which is housed in an Ex d housing and is therefore specially approved for use in potentially explosive environments. Just like in any production facility, employees must first register their presence using a tag to access each area of the oil platform. All process-related information is stored locally on the tag itself, thus enabling track-and-trace applications. Unique identifiers allow raw materials, products, or, in this case, personnel, to be assigned and tracked. The backend software determines whether the employee is authorised to access the area in question. If so, the software unlocks the relevant cabinets and doors. The software simultaneously documents the employee’s current location. This is particularly important in emergency situations. When an alarm is triggered, information about the exact location of personnel is essential for evacuation purposes.

Other sensors are also suitable for use in hazardous areas. For example, sensors using pulse ranging technology (PRT) for object detection. This same technology is also used by the R2000. The sensors are installed in Ex d housings to allow them to monitor a wide variety of different processes. A powerful light source in the sensor emits short pulses that are reflected by the target object and then captured by a highly precise, light-sensitive receiver element. The distance to the target object is then calculated from the values recorded. A Norwegian manufacturer of hoses and flexible tubes for oil production uses this technology to determine the fill level of its storage facility – as you would expect, this involves hazardous areas. The VDM28 sensor installed in the Ex housing enables a measuring range of up 50 m from the reflector. If the fill level is not reached, this triggers automatic processes for filling the position or ordering more materials.

Inclination sensors such as the INX360 are placed in Ex d housings, enabling them to be used in tunnel drilling plants for monitoring the angle of the drilling arm. 360° control allows any unwanted movement of the drill to be detected and limited immediately. The unique technology used means that the measurement result is not influenced by the changes in speed that are unavoidable in mobile applications. The error-free inclination detection in this dynamic application therefore enables high-precision drilling. Stationary readers such as the OPC120 are used to read 1D and 2D codes quickly and reliably in hazardous areas. The devices are so precise that even reflective surfaces can be reliably recorded.

The list of examples is endless. Pepperl+Fuchs therefore not only offers engineered solutions for specific customer requirements and applications. The company also offers standardised, off-the-shelf products that are capable of simplifying a number of process operations when placed in Ex d enclosures. The company offers a selection of standardised and certified sensors that are permitted for use in zones 1, 21, 2 and 22 and have been released for sale. In addition to the aforementioned INX inclination sensors, OPC readers and VDM28 distance sensors, IQH and IUH read/write heads and VLM350 laser light sensors are also available. These devices have been reinforced for use in the approved areas and are able to help companies take the next step toward automation.

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Power transformers are generally regarded as ‘safe’ pieces of equipment. However, in practice, they can present some quite serious risks. This is due to the large quantities of oil that they contain which is in contact with the high voltage elements. As a consequence of temperature changes and in many cases overheating of the transformer core, various gases can be generated within the transformer oil system. These will tend to accumulate in the space above the oil in the reservoir – which is usually filled with nitrogen. The gases generated include several hydrocarbons and also hydrogen.

During daytime hours the increase in temperature causes the gas space pressure to increase while at the same time the oil expands. Some of this gas dissolves in the oil. During the night, the process reverses: the temperature drops, the oil contracts and the gas space pressure drops. Ideally, all the excess gas would return to the gas space, but frequently an excess remains in the oil which is then considered to be supersaturated. Any mechanical disturbance such as the sudden starting of a pump, a lightning strike, or movement within the windings as a result of a sudden large increase in current, could release the excess gas as bubbles in the oil.

Typical gases that appear in transformers are hydrogen and methane, which begin to form in small amounts at around 150°C. Thermal decomposition of cellulose materials begins at about 100°C and these processes produce hydrogen, carbon monoxide, carbon dioxide, methane and oxygen. This is a compelling reason why transformers should not be operated above 90°C.

**Explosion risk and the Gen5 System**

A large percentage of transformer failures are caused by ignition and explosion of these gases. Dissolved gas analysis (DGA) should therefore be a primary maintenance routine for transformer operators. Traditionally, this is carried out by technicians that visit transformers on a regular basis and carry out tests to identify the presence of gases dissolved in the transformer oil. This is an expensive and frequently unreliable procedure. Due to the decreased availability of personnel taking DGA samples – a situation aggravated by the COVID-19 pandemic – many utilities now choose real-time monitoring of transformer dissolved gases.

RTS Africa Technologies (RTS) is able to provide DGA analytical instruments designed specifically for real-time monitoring of transformer dissolved gases. RTS Africa Technologies (RTS) is able to provide DGA analytical instruments designed specifically for real-time monitoring of transformer dissolved gases. RTS Africa Technologies (RTS) is able to provide DGA analytical instruments designed specifically for real-time monitoring of transformer dissolved gases.

The Gen5 System enables real-time hydrogen monitoring for reduced risk of explosion and catastrophic failure and is ideal for use in distribution transformer applications, including those located in populated areas such as suburbs, under streets and in industrial sites. The system delivers high accuracy sensing at an affordable price with over 15 000 units already installed.

The sensor system works with oil immersed transformers and offers real-time, or step-change monitoring to report hydrogen levels as they fluctuate. It can track hydrogen levels in the transformer oil from 25 ppm to 5000 ppm at oil temperatures up to 105°C. The real-time monitoring is ideal for smaller transformers where power overloads can cause higher temperatures that quickly drive up hydrogen levels.

The Gen5 System incorporates H2scan’s patented auto-calibration technology, requiring no maintenance or recalibration for up to 10 years. Total install or retrofit time is less than one hour. The instrument is IP68 rated and can withstand 14 days submersion in water to a depth of up to 10 metres, making it ideal for underground vault transformers. In the midst of the COVID-19 pandemic, the Gen5 System is a game changer for utilities wanting to eliminate manual sampling and substation visits by maintenance crews.

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Bernstein has introduced its new safety rope (SRO) limit switch to the international market. Bernstein has focused on developing electrical safety products to protect machine and process operators for over 70 years and the SRO is no exception.

The German-based industrial safety technology company is represented in South Africa by Anglo Allied Engineering. Managing director Karin Visser explains: “The SRO is a rope pull switch that provides safety for conveyor belts or machines. As a supplementary safety function it was designed to be installed on machines in addition to existing safety devices, but is not a replacement for other safety devices. The SRO comes into play if other measures stop working or the user is unable for any reason to conduct a normal stop.”

An emergency stop happens when a dangerous movement is anticipated or has been spotted. It is different to a normal stop, which switches off the power. With one action, any person present can avert danger by hitting the emergency stop button.

The SRO emergency stop device has an ISO13850 rating. Its compact design is useful for narrow spaces and distances of up to 30 metres can be secured. The rope device is made of metal and the housing comes in either plastic or metal. The SRO combines two different devices in one: an emergency stop activated by pulling a rope and an integrated emergency stop button on the device.

Applications in which the SRO can be used include packaging machines, woodworking machines, intralogistic systems, printing and paper machines, textile machines and automation systems.

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For one of Europe’s largest sugar manufacturers, the constant delivery of raw materials by truck and their redistribution by wheel loader means a continuous logistical effort. To prevent collisions and improve worker safety, Cologne-based sugar producer Pfeifer & Langen selected SICK Automation’s Visionary-B CV 3D driver assistance system for use at its reloading point.

The 3D camera sensors deliver real-time imagery with optical and acoustic warning signals for improved collision avoidance, even under changing weather conditions, such as sun, rain, snow or early sundown. The 3D snapshot technology evaluates the position of relevant obstacles using the single check principle: intelligent algorithms developed by SICK filter information that is not relevant for the driver e.g. curbs, small stones, rain, or fog. This means that the driver assistance system only warns the driver in critical situations.

The goal was to find a solution which would satisfy company management, safety officers and operators. Due to its versatile experience with the Visionary-B as a driver assistant for large work machines and the reliable feasibility statement resulting from this, SICK proved it was the ideal partner. The presence of SICK employees onsite and their close supervision were the final dealmakers in Pfeifer & Langen selecting SICK Automation.

The 3D solution assists large wheel loader drivers during manoeuvring and unavoidable reversing, by monitoring the blind spots directly behind the vehicle, for example. A dual system was installed to protect the hard-to-see sides of the vehicle at the same time. The camera sensors mounted on the rear right and left sides of the wheel loader send a live image to two separate screens in the driver’s cabin, which are mounted on the right and left sides like exterior mirrors.

For drivers, there is the very pleasant ‘trained behaviour’ feature. Due to the familiar arrangement reminiscent of rear-view mirrors, they can reliably operate using the assistant right away without requiring any learning phases. The onsite test runs proved their effectiveness.

The high acceptance by drivers, who rated the assistance system as impressive, was especially notable. They also found the system a helpful instrument for increasing operational safety. The Visionary-B CV helps drivers operate sustainably to protect humans and materials.

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If you work at a large industrial plant or mine, you may have noticed those hydraulic lubricating oil packs, or perhaps the diesel generator sets, oil store rooms, pump rooms or flammable liquids stores, and transformers. And in particular on mines, you may have noticed the winding gear. These areas are all potential sources of fire that if not controlled can result in major incidents occurring, even serious injury or death. These areas are where hydrocarbon fires can occur, which ignite quickly and spread rapidly.

If not checked immediately, damage can translate into millions of Rands. The common thought behind tackling such applications is to use a water-based approach. This usually means piping and pumping extinguishing water from a large tank, leading to significant cost due to civil works, pipe fabrication, transportation costs, design fees, labour, testing, commissioning and the like. Some other approaches include costly water mist systems, but all require an electronic-based automatic fire detection system.

PyroStorm – the low cost alternative option
Alien Systems & Technologies (AST) offers a low cost, autonomous alternative option. PyroStorm is a range of impulse dry powder, modular type fire suppression units designed for industrial type applications. These non-pressurised units can be configured to virtually any application. They are light weight, easy to install and transport, and no pipework is required. In normal applications they are also maintenance free for 10 years. The cost-effective PyroStorm units are hermetically sealed thus preventing contamination by dust or by water of the Furex ABC extinguishing powder contained in the unit.

When the module is activated during a fire situation, a chemical reaction occurs within the PyroStorm module creating a positive pressure. The discharge diaphragm then expands and ruptures, expelling the extinguishing powder at a rate of up to 35 m/s. This occurs in less than half of a second from the initial activation. Large volumes of powder are then discharged into the protected area in less than a second – putting out the fire rapidly and effectively.

Dry powder from the PyroStorm module attacks the fire in a combination of two extinguishing methods. Chemically, by the removal of the fire propagating ‘chain carriers’, and physically, via four processes:
2. Dilution of the flame zone with the powder cloud and its subsequent decomposition products.
3. The creation of physical barriers in the fire zone.
4. The creation of a ‘fire blanket’ on the surface of the burning materials, which then smothers the fire.

Units can be used as stand-alone or configured into a system using the voltage free heat activation devices (HADs), which provide reliable electrical activation via temperature sensing without the need for batteries or electrical supplies. HADs will detect an increase in temperature i.e. a fire, and automatically, at a pre-set temperature, activate the PyroStorm units. Furthermore, these devices can be used to signal a fire panel as well as provide an additional output designed to shut down the electrical equipment or activate a separate alarm.

AST also offers a variant of the HAD unit known as a manual activation device (MAD), which can be placed at emergency exits and other strategic points.

PyroStorm systems are a preferred solution currently used by many mining houses in South Africa, and also across the rest of Africa, in both surface and underground applications. Due to the low maintenance requirements, a rugged design and minimal independence from an electrical power or water supply, PyroStorm offers a simple and cost-effective solution when it comes to protecting industrial control equipment.

All systems are engineered by AST’s in-house design team and fabricated to ensure maximum effect. They can also be implemented as part of a more complex fire protection system should that be required.

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Process Dynamics – process gain

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

An instrumentation technician once told me that to him a process consists only of a trace on a screen. This is rather sad. If one wishes to control a process, then it is important to have a reasonable basic knowledge and understanding of the process itself and certainly one should also be aware of what external influences can act on it. To this end, if you are not intimately familiar with the process yourself, it is essential that you work with a process expert who can guide and help you in gaining this understanding. Apart from this, if you wish to successfully optimise the control of a process, it is also essential that you establish the dynamics of the process.

Process dynamics are described by an equation known as the process transfer function, which can be loosely described as various factors which cause the output of the process to respond in a particular way to any change on the input of the process. The importance of understanding the dynamics of any process is fundamental to successful control optimisation and cannot be overstressed. In our control optimisation courses, process dynamics occupies a large part of the more advanced part of the course. Unfortunately, all this information is beyond the scope of these articles and only a few of the more basic factors will be covered, viz. process gain, deadtime and single first order lags. It is of interest to note that these three factors were and largely still are, the only factors that are taken into account in many of the more simplistic tuning techniques, (for example, Ziegler & Nicholls tuning), which is one of the reasons why these tuning methods often fail, as there are also many other dynamic factors that may occur in real process responses.

In this article, we will deal with process gain, firstly for self-regulating processes and secondly for integrating processes.

Self-regulating loops

Figure 1 shows a simple pressure control self-regulating loop. The controller is in manual and a step change is made on the output of the controller (process demand – PD). The pressure (process variable – PV), rises up exponentially and settles out at a new value. The process gain is defined as the size of the step in PV, measured after it has reached steady state, divided by the size of the step that was made in the PD. The measurements are made in percent of span and as these units cancel, the process gain of a self-regulating process is unitless. It is also sometimes referred to as loop forward gain, or steady state gain. It can be thought of as an amplification factor in the process.

In practice, the process gain is very important. It is made up by two factors, the first being the valve sizing and the second the spanning of the transmitter. Ideally one would like to use the full span of both devices, particularly that of the valve, which being a mechanical device is limited in rangeability and may suffer from problems like hysteresis and backlash. Therefore, if the valve was moved from 0-100% open operating position and the measurement responded likewise from 0-100%, then the process gain would be unity, which is ideal.

As a general rule of thumb, if the process gain is greater than unity the valve is oversized and if it is less than unity, it is usually due to the transmitter span being too wide.

One disadvantage of a valve being oversized is that the proportional gain in the controller has to be correspondingly reduced to achieve a desired response. This leads to problems on many controllers that have limited low end gains. Typically, many commercial controllers are limited to a minimum gain of 0,1 (or 1000% proportional band). On fast processes like flows, which are tuned with low gain and fast integral, it may not be possible to set a low enough gain in the controller if the valve is oversized.

Another and probably even more important disadvantage of oversized valves, is that the process gain actually amplifies the valve imperfections and results in a degradation of control performance. Therefore, if a valve suffers from say a 1% hysteresis cycle (which is pretty normal), the offset as seen on the PV will be that 1% offset multiplied by the process gain. For example, if we had a process gain of 4, then the offset on the PV would be 4%. This means that the control error also becomes bigger in a directly proportional relationship to the valve oversizing. Also, if a cycle occurs in closed loop due to a valve problem, like a hysteresis cycle on an integrating loop, then the amplitude of the cycle as seen on the PV will also be multiplied by the process gain.

On the other hand, if a transmitter is spanned too wide which results in a process gain of less than unity, problems can occur firstly with the quality of the measurement. For example, if the process gain was 0,5, it would mean that only the first 50% of the transmitter span was being used. If this was on, say, an orifice flow, it would severely limit the useful flow range and measurement accuracy.

Secondly a low process gain also necessitates having to increase the controller proportional gain to achieve a particular control response. This makes the output of the...
controller more ‘jumpy’ and will also further amplify signal noise which results in increased valve wear and possibly increased control variance.

As a general rule of thumb, good engineering practice dictates that the process gain for a self-regulating process should lie between 0.5 and 2.0.

Figure 2 shows an open loop test performed in a South African petrochemical refinery on a flow control valve that was hugely oversized. The process gain in this case was close to 13! The valve itself had negligible hysteresis and as a result, in this particular case, good control could in fact be achieved. However, to realise this, the proportional gain that had to be inserted in the controller was 0,000125 (or proportional band of 8000%)!

**Integrating loops**

Process gain for an integrating loop is rather different. As explained in the last article in this series, the PV can only be constant in an integrating process when the PD is at the balance point. Once the PD moves off balance the PV starts ramping.

One way of defining the process gain for an integrating level loop would be as the slope of the PV ramp resulting when the PD is at 100% and there is zero flow out of (or into, as the case may be), the other side of the tank. Figure 3 shows how the process gain is measured in practice for such a process. The unit of process gain for an integrating process is ‘inverse seconds’. (It is a slope).

The reciprocal of the process gain for a level process is known as the tank retention time. This is the time that it would take for the tank to empty from full to zero if there was no flow into the other side of the tank. As most tanks would take a considerable time to empty, it becomes apparent that the process gain of most integrating processes will be tiny numbers, generally much, much, smaller than unity. For example, if the retention time of a tank was 1000 seconds, its process gain would be 0,001.

Therefore, in light of this, another fact becomes immediately apparent, which is that if fast control is required for integrating processes, in most cases, one is going to need relatively high proportional gains in the controller to counter the small process gains.
Rethinking pneumatic technology for the factories of the future

Widespread digitalisation has helped usher in the era of Industry 4.0, where automation and data exchange combine to provide real-time insight across the performance of equipment, driving efficiencies across the shop-floor.

As manufacturing continues its rapid journey to digitalisation, one must ask, what will become of conventional technologies? Take pneumatics for example, which remains based on the age-old principle of controlling compressed air through tubes. Does a technology such as this have a central role to play in the flexible, smart production lines of the future?

The answer is a resounding yes, according to the findings of a recent research study of discrete manufacturers carried out by Parker Hannifin’s Pneumatic Division. Pneumatics is still seen as one of the most suitable means of providing controlled movement on complex automated lines, a critical requirement for digitised manufacturing. Imagine, for instance, a multi-product assembly system utilising pneumatic actuators for the use of controlled motion or force. Such components are typically powered by clean, dry air. This is one reason why, according to the research, demand for pneumatic automation equipment is expected to increase substantially in the era of digital manufacturing.

Pneumatic system capability in the new era
This presents real opportunities for the suppliers of pneumatic systems, as they look to adapt to the concept of digitalisation and the need for the real-time processing of data. Indeed, many suppliers have adapted their products in line with Industry 4.0, developing pneumatic systems that are equipped with cost-efficient sensors. These enable OEMs to monitor the real-time status, condition and efficiency of the various components that make up the modern automation line, such as actuators, air-preparation units and smart directional control valves.

At Parker, for instance, the entire product development cycle has been focused on making simple devices smarter, by ensuring that they can communicate easily with the rest of the network on the factory floor. But what does this mean in terms of application in practice? Well, for example, in days gone by a filter could have become clogged, causing possible downtime while the system was checked and the filter changed. Now, the filter element can communicate its status directly, sending a message via the PLC when it needs to be changed. This ability to underpin intelligent maintenance proves that pneumatics can play a central role in advanced Industry 4.0 methodologies, helping manufacturers to improve their operations.

How machine builders can futureproof their designs
While the development of this kind of technology continues to progress, machine builders need to make careful choices now to future-proof their designs. Indeed, Parker firmly believes that low-cost, open-source industrial Ethernet (IE)-based shop-floor connectivity will provide the best solution and many manufacturers are already shifting their plants in this direction. In practice, the use of IE and IO-Link network nodes make the control, safety and maintenance of a range of different machines simple and cost-effective, regardless of location. Indeed, ensuring that key automation components are IIoT-enabled in this manner is an excellent way for machine builders to innovate in the factories of the future.

In terms of Parker’s focus on IE/IO-Link-enabled connectivity and networking solutions, there has been a range of intelligent new components brought to market. The CPS line of analog/digital sensors, for example, can provide end-users with cycle time, position feedback and overall health of an actuator. The sensor continuously detects the position of the magnetic piston of the actuator using a direct, non-contact technology. This transfer of positional data, via analog outputs or IO-Link, upgrades the functionality of the pneumatic cylinders by making them more intelligent and as a result, more versatile.

Meanwhile, the IO-link-enabled H-Universal solenoid valve manifold system is a family of base-mounted valves available in five size ranges. This provides machine designers with a new set of tools to ‘right-size’ their valve selection to ensure optimum valve/actuator performance.

Celebrating a new spirit of innovation
As an already well-established technology, pneumatics lends itself well to the advancement of the IIoT-enabled factory. In this increasingly digital manufacturing sphere, pneumatic systems will no doubt continue to see a trend towards adaptation for real-time process data through the incorporation of networked nodes and sensors. As such, this tried and trusted technology will be around for a long time to come.

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EtherCAT I/O for conveyor control

With the new EP7402 EtherCAT Box from Beckhoff, the control architecture and cabling of roller conveyor systems becomes significantly more efficient. With the high IP67 protection rating, this compact motor controller for BLDC motors is ideally suited for conveyor tasks in intralogistics and assembly technology as well as in the packaging, food and beverage industries.

The EP7402 offers two outputs with integrated motion controller for the direct connection of 24 VDC conveyor roller motors or other BLDC motors (up to 3.5 A). Eight additional digital inputs/outputs enable connection of e.g. photoelectric switches and communication between the different box modules in operation without a PLC. The EP7402 takes over the complete control of a roller motor independently of the conveyor or motor manufacturer. The control of the motors is sensorless and maximum rated current, acceleration or deceleration ramps and various other parameters can be configured, allowing optimal adaptation to different applications.

In conveyor operation the EP7402 can also be operated without a PLC and provides functions such as Zero Pressure Accumulation (ZPA), single or block discharge. Further EtherCAT devices such as digital and analog I/Os, barcode readers or safety devices can be connected to the additional EtherCAT junction. The EtherCAT Box with IP67 protection rating measures only 174 mm x 60 mm x 36.5 mm and can be easily mounted in standard C-channel or L-brackets on the conveyor frame.

It requires no additional protective covering, which saves additional installation space. Power supply and EtherCAT communication take place via a single cable with a B23 ENP hybrid connector (28 A/45°C current carrying capacity).

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New product releases from SMC Corporation International Training

SMC International Training, the Didactic division of SMC Corporation, has been a global equipment supplier for the past 20 years.

Taking industry needs as the benchmark, this training equipment is designed for universities, vocational training centres, technical training centres, plus companies who provide their own training internally. With the focus on factory automation, the training equipment is designed to ensure the learner is exposed to all aspects and technologies in an automated system or production line.

To ensure a smooth transition and integration for learners from education institutes into industry, the training equipment includes all the latest automation equipment used in industry.

For the past 20 years, the organisation has been continuously improving and introducing new training equipment and systems to keep learners up to date with the latest technologies mirroring applications in practical working environments. The product range includes online eLearning, design and simulation software for fluid systems pneumatics, hydraulics, PLCs, industrial process control and mechatronic hardware and systems. Over the past couple of months, while the world was in lockdown due to the COVID-19 pandemic, SMC International Training has been hard at work to bring new products to add to the already comprehensive list. The new product releases include:

- Basic electricity and electronics trainer.
- Industrial electrical control trainer.
- Instrumentation and process control trainer.
- Mechanical trainer.
- Programmable logic controller trainer.
- Industry 4.0 system (compact special edition).

Basic electricity and electronics trainer
The basic electricity and electronics trainer provides hardware for hands-on activities and the study of DC, AC and solid state fundamentals. All devices are permanently mounted and can be quickly connected in a variety of configurations via banana jack connectors. Users will be introduced to the functions and use of various devices and circuits. In addition, test equipment and fault insertion activities will allow for development of troubleshooting skills.

Industrial electrical control trainer
The industrial electrical control trainer provides students with a flexible system allowing for hands-on experiments in wiring and troubleshooting of electrical control circuits.

Instrumentation and process control trainer
The instrumentation and process control trainer allows students to perform practical and tactile experiments in pressure, flow, level and temperature applications. The system’s unique design allows rapid conversion between pressure, flow and level experiments by adjusting the position of valves. All devices are pre-wired to terminal strips allowing for quick circuit modification. Activities in loop wiring, transmitter setup and loop tuning of PID parameters provide a thorough understanding of process control.

Programmable logic controller trainer
This system provides a solution and environment for hands-on interaction and understanding of programmable logic controllers including digital I/O, analog I/O and communication with the SMC human machine interface.

Mechanical trainer
The mechanical trainer system provides participants with hardware allowing for interactive experiments in mechanical shaft alignment, pulley alignment, belt installation, sprocket alignment, chain installation, gear alignment practices and speed ratios.

Industry 4.0 system (compact special edition)
Develop the skills most in demand for 4.0 technologies and be prepared for the new challenges presented by Industry 4.0. The system offers professional training according to the industrial reality, simulating a real assembly process and including different technologies from Industry 4.0.

For more information contact SMC Corporation South Africa, +27 10 900 1233, rvaneck@smcza.co.za, www.smcza.co.za
Hydraulic hose installation and maintenance

BMG’s portfolio of components for fluid power systems and general industrial applications includes the full range of Eaton Winner hydraulic braided and spiral hose and fittings, which meet stringent industry standards for pressure, temperature and abrasion resistance.

“BMG’s Eaton Winner braided and spiral hose and related fittings are perfectly matched hydraulic hoses and fittings, which ensure safe and reliable conveying of petroleum and water-based hydraulic fluids at high pressure, even in the most demanding environments,” says David Dyce, BMG’s business unit manager, Fluid Technology. “Apart from ensuring that all hoses are supplied with system-matched fittings, the BMG team stresses that extreme care must be taken in the correct installation methods and maintenance procedures. Hose assemblies can be highly dangerous if misapplied and if inadequate attention is given to the maintenance of hose and related equipment.”

According to BMG specialists, key factors to consider during correct hose installation include changes in hose length, the correct bend radius, protection of the hose from high temperature sources and the importance of elbows and adapters to relieve strain. It is also critical to prevent rubbing and abrasion of the hose, as well as twisting and improper hose movement.

Proper maintenance of hoses and related equipment is essential for safe and dependable operation, as well as extended service-life of the system. Important factors to consider include visual inspection of the hose before installation and if there is a cut or gouge in the cover that exposes the reinforcement, this hose should be discarded.

Hose should also be inspected for kinking or broken reinforcement and if the outside diameter of the hose is reduced by 20% at the spot where it is bent, this hose should not be used. Hoses must be stored in a dry place. Inadequate attention to maintenance of the hose can result in hose leakage, bursting and other failures, which can cause serious injury or property damage.

BMG’s comprehensive catalogue of hydraulics hoses and fittings includes an easy-to-follow reference fluid compatibility and resistance chart, technical information on the extensive range of hoses, fittings and adapters, as well as critical information on correct product selection, installation and safety guidelines.

For more information contact JP Steyn, BMG, +27 11 620 7538, jps@bmgworld.net, www.bmgworld.net
Parker releases new software tool

Parker Hannifin has developed a user-friendly service and maintenance tool for its IQAN series of controllers and displays. IQANgo enables service technicians or machine owners to connect wirelessly to modules in their machines, allowing them to perform a broad range of actions such as system status checks and troubleshooting errors or alarms.

The iOS and Android-compatible app connects to modules via Wi-Fi, Bluetooth, or the Internet, providing remote access to information in real-time. The tool has been designed with a compact interface that perfectly fits the screens of both tablets and smartphones, displaying all relevant data and graphs in a clear and easy-to-read manner.

Specific features of the new tool include a system overview that allows users to find module or I/O-related alarms or errors quickly. Meanwhile, a remote assistance function means smartphones can act as a ‘modem’ to connect IQAN machines to the Internet, allowing remote personnel to perform operations such as fault finding, software updates and calibration.

IQANgo also allows users to view all logs and their content, with a filter function providing quick access to relevant information. A measure function delivers a more powerful tool for troubleshooting, or to view the value on a specific input, output or internal channel. All measured values are presented with their corresponding unit and status, or in a more visual format such as a line graph.

Furthermore, it comes with a function for adjusting inputs, outputs and parameters in real-time. It is also possible to take a setting back to its factory default value if required.

Johan Lidén, product manager at Parker Hannifin commented: “IQANgo is a powerful and intuitive platform that gives service technicians or machine owners instant access to real-time information, allowing them to work more flexibly and productively. This actionable insight drives more informed decision-making around service and maintenance activities, which in turn improves equipment performance, saving both time and money.”

For more information contact Lisa de Beer, Parker Hannifin SA, +27 11 961 0700, lisa.debeer@parker.com, www.parker.com/za

New Modicon IIoT-ready controller

Schneider Electric has announced a powerful new solution for the smart-machine era. The Modicon M262 controller is IIoT-ready for logic and motion applications. It offers intuitive, scalable and reliable machine integration into the Industry 4.0 environment, machine to device, machine to human, machine to machine, machine to plant or machine directly to cloud.

The M262 embeds cybersecurity features and encryption protocols to provide direct cloud connectivity and digital services thanks to its two ready-to-work and independent embedded Ethernet ports. Key benefits include:

**Connectivity:** up to five one-to-one independent Ethernet networks and cyber-secured cloud connectivity options for easy integration into the plant with open protocols, including OPC UA, PackML and SQL, or to the cloud with MQTT, JSON or HTTPs requests (API).

**Efficiency:** with four to 16 synchronised axes with scalable cycle time down to 1 ms and a 3 ns/instruction processing speed independent from communication tasks, the controller responds to performance demanding motion applications.

**Flexibility:** the M262 also addresses logic application needs, as an ‘all-in-one’ motion controller, embedding all the features of Motion bus, encoder and touch probes.

**Protection:** with an embedded safety solution, the system complies with the latest safety regulations up to SIL3. It offers embedded encrypted communication, network separation, Achilles certification and other cybersecurity features.

**Connected for greater efficiency**

The IIoT-ready design delivers intuitive direct cloud connectivity, which enables OEMs to maximise profitability and optimise their time, from the design of performance-demanding applications to the commissioning of the machine.

The new M262 is an integral part of Schneider Electric’s EcoStruxure Machine, a complete architecture that brings powerful capabilities to smart machines. EcoStruxure Machine empowers machine builders and OEMs to innovate in the new, digital era.

Easy connection to EcoStruxure Machine Advisor delivers unprecedented insight into machines. Machine Advisor allows OEMs to enable asset monitoring and predictive maintenance, thereby expanding possibilities for generating end user services revenue.

For more information contact Vikash Rampathi, Schneider Electric SA, +27 11 254 6400, vikash.rampathi@se.com, www.se.com/za
Robots could solve the social distancing problem

The contagion of COVID-19 has swept through the lives of people across the globe, disrupted industries and had a dramatic impact on the world's economy. Some analysts predict the pandemic's impact could be as devastating as the Great Depression, which lasted from 1929 to 1933.

As the world moves towards a different tomorrow, future-orientated solutions won't merely be an option for industry, but an absolute necessity. Robotics and automation technology are already playing a pivotal role in the health sector – from the use of automated laboratory tests to autonomous disinfectors utilised in hospitals, but they're about to extend further into other industries faster than anyone could have predicted.

“The automotive industry has always been closely tied to robotics and this is unlikely to change,” says Kurt Rosenberg, managing director of Yaskawa Southern Africa. “The fast-moving consumer goods (FMCG) and food markets, however, should see an increase and acceptance in the usage of robots and automation technologies. This is largely due to the ‘contact’ element, as health and safety officers will be even more concerned about cleanliness, sanitisation and hygiene in manufacturing processes, handling and distribution of goods and factories. Considering COVID-19 can survive on certain surfaces, measures will need to be put in place to futureproof businesses from any potential outbreaks. And this is where robotics could come in to reduce contact and cross-contamination.”

While many industries have instituted stringent hygiene standards and practices for operations, they are also acutely aware of the human element. All it takes is one lapse and the risk of infection is catastrophic. There have already been several high-profile instances where essential services, such as hospitals and factories, have had to temporarily shut their doors because staff have been infected by the virus.

The robot-powered workforce

Back in the seventies, Yaskawa proposed the innovative concept of an unmanned factory termed ‘Mechatronics’. Since then, the concept has evolved into i³-Mechatronics, featuring further advancements and implementations of automation through the management of digital data. Whether it’s partial or full automation, there are flexible solutions that allow for smart integration, real-time visualisation of systems and industrial evolution through technological innovation.

Not only do these solutions increase overall productivity and systems processes, but there’s also the ability to improve standards and quality of both the manufacturing plant and products.

Considering the current restrictions of the number of employees allowed back at work and the need for social distancing, the industries that embraced i³-Mechatronics are better prepared to deal with the pandemic’s side effects. From the stability and reliability of streamlined production (despite fewer employees at their disposal) to rigorous health and safety standards, a robotised workforce is capable of business as usual even in unusual times.

Rosenberg believes a robot-powered workforce is the way of the future, both locally and internationally. While he’s seen a significant uptake in robotic technology in South Africa, there are positive signs it’ll grow in the years to come as businesses make provision for these types of advancements.

At the same time, there’s a fear that robots will take the place of humans in the workplace, hence the reluctance to embrace technology. Andrew Crackett, national sales manager at Yaskawa Southern Africa, believes it’s actually affording more opportunities to both organisations and employees.

“We’ve implemented several projects at labour-intensive organisations to streamline operations,” says Crackett. “Instead of seeing a reduction in staff, we’ve actually witnessed the employees reassigned to other areas or new positions. By freeing up resources, there’s the possibility to upskill and redeploy, while still improving the overall process and positively influencing the organisation. Robots will still need quality assurance, operators and support staff, as an example.”

While the havoc caused by COVID-19 cannot be understated, it has also pushed industries to think towards the future and plan better. A robotised workforce might not seem like something out of a sci-fi film anymore, but a necessary requisite for any business to survive in the face of disaster.

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Monitoring for control cabinets

Turck has expanded its series of cabinet guards with the addition of the IM18-CCM. The integrated sensors of the narrow 18 mm device monitor temperature, air humidity and door distance, in order to send this information via Ethernet to higher-level IT systems. External devices such as vibration sensors for monitoring states can also be integrated via Modbus RTU and CAN.

The IM18-CCM is particularly suitable for OEMs wishing to provide basic condition monitoring values in their IT system. It detects critical states of the control cabinet directly in the field. Creeping changes or systemic problems can also be detected through long-term evaluations. The IM18-CCM thus bridges the gap between the OT and IT world and enables users to analyse the data material from the factory level directly from their office desk. The Linux platform of the IM18-CCM also allows installation of any customised condition monitoring software. In this way, measured values can be pre-processed and prepared on the device for the specific requirements of the application.

The IM18-CCM is the third model in Turck’s cabinet guard series. The two 12 mm devices IM12-CCM and iMX12-CCM come with an onboard condition monitoring software for monitoring limit states and long-term data series.

For more information contact Turck Banner, +27 11 453 2468, sales@turckbanner.co.za, www.turckbanner.co.za

Check valve with redundant sealing

The new model CV check valve from WIKA is designed for a wide range of applications in the process industry. Its sealing system with a self-canting piston reliably prevents backflow of liquid and gaseous media.

The reliability of the new instrumentation valve is mainly due to its redundant sealing, consisting of an O-ring and a metal cone. Its leak tightness has been tested in accordance with BS6755/ISO 5208 leakage rate A. The solid-machined, robust design of the model CV ensures high repeatability and a long service life, even in heavy-duty applications. The pressurised parts correspond to the safety factor of 4:1.

For the new check valve, WIKA offers an application-specific assembly with a measuring instrument. Such an instrument hook-up is delivered ready-to-install and leak tested.

For more information contact WIKA Instruments, +27 11 621 0000, sales.za@wika.com, www.wika.co.za

Conductivity sensor for interface detection

The differentiation between media plays an important role, especially in the food industry. Cleaning agents, rinsing water and food products located in process pipes have different conductivity values and can therefore be easily and reliably detected.

The conductivity sensor LDL100 for interface detection from ifm electronic ensures that product validation is possible at all times. Quick and reliable differentiation between the media leads to a reduction in wasted product and rinsing water. Other benefits include:

- Reduce inaccuracies associated with a time-based cleaning process.
- Improve process performance with flexible measurement points.
- Compact, high-quality sensor design prevents failures and unplanned downtime.
- Simplified installation and commissioning processes.
- Loss-free signal transmission of measurement values.

Applications

The differentiation between media plays an important role, especially in the food industry. Cleaning agents, rinsing water and food products located in process pipes have different conductivity values and can therefore be easily and reliably detected.

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