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ifm's PMD profiler provides precise object scanning using accurate contour detection for inline quality control checks in assembly and handling applications.
(Read more on page 3).

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Eskom and the art of bicycle repair

(with apologies to Robert M Pirsig)

One tries not to reflect on a variety of topics in a comment that, like this one, is largely technical but focused on the foibles of our industry. But sometimes one does need to stare down some of the impediments to progress – politely, of course. But without sugar-coating any of it.

And I must comment on Eskom – an organisation that I have been close to for over three decades.

I noted with interest the analogy that the new CEO, André de Ruyter, has used to describe the situation – a bicycle with the chain off, being pushed along – with no one bothering (or being allowed?) to actually sort out the chain. He was quoted by *Fin24* in this regard.

It seems so good and right that the fellow carries on dutifully pushing the bike along, even if it is slowly, and ineffectively, and wasting energy on an inefficient system…

It is a lovely analogy – and a truthful one.

The fact of the matter is that the chain really is off – indeed, it may even be broken.

To date all we have been doing is pausing, momentarily, to kick a pebble away from just in front of the wheels – and then carrying on pushing… dutifully, and earnestly.

So the point being made was that we find ourselves so busy pushing that bike along, and now and again kicking away a pebble (some of which, it would seem, are not visible until the very last moment), that no one thinks to slow it down enough to allow a skilled cyclist to quickly and effectively put the chain back on – and jump back into the saddle.

I suppose, however, that we cannot avoid also reflecting on the possibility that the chain is not just off – but that it really has broken and has been dragging along in the dirt.

This is a real possibility that must be considered.

What we probably need to hear also, therefore, is that maybe we can't sort out the chain by slowing down alone: maybe we need to stop – for a while – to tip the bike over and call for the chain repair specialists.

Whom we hope will be within earshot.

My sense is that we need to move rapidly to a time when we speak openly about that bike – about what may be wrong, and how quickly we can coordinate the stopping and the arrival of those chain repair specialists.

What I am certain about is that the bike can be fixed – but if, and only if, we do it properly.

And that will be a bitter pill to swallow – as other cyclists will pull away even faster. But, we'll be back in the race. And I am confident we will catch them!

Ian

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

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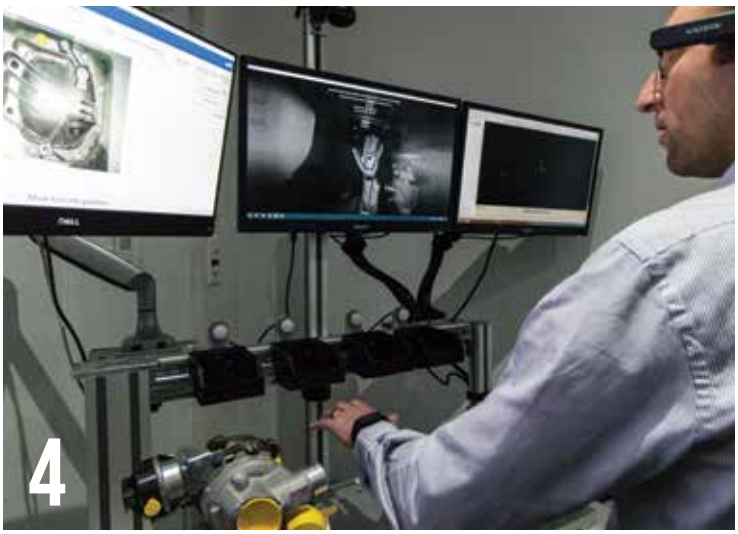
REGULARS



The PMD profiler: accurate contour detection for inline quality checks

- Inline quality control checks to ensure correct assembly of parts
- Quick setup without software
- Distance-independent measurement for high tolerance on object positioning
- Immunity to extraneous light – no screening or external illumination required
- Improved performance with IO-Link
- Optional contour visualisation via software to simplify failure analysis

Precise object scan for quality control

In assembly and handling applications, the profiler does not only verify the presence of an object, it also checks whether the correct component has been used and properly installed. A push of a button is all that is required to compare the contour of an object with the taught target contour stored in the profiler. The photo electronic line scanner reliably detects tiny differences between nearly identical components.

Since the distance is not relevant, the PMD profiler does not require complicated positioning, as is the case with 1D sensors. Its insensitivity to extraneous light means that no screening or external illumination is required, as is the case with camera systems performing to this high level of accuracy. With its user-friendly colour display and intuitive setting with only three pushbuttons, the sensor is ready for use within a few minutes, without requiring any software. It is possible to transmit information on either the reject rate or the detected object profiles via IO-Link.

Installed inline the PMD profiler provides quality control checks on parts for assembly.

Region of interest: high degree of accuracy

To make the determination of differences between nearly identical components even more reliable, the profile evaluation can be narrowed down to the relevant object area with two markings by using the 'region of interest' function. This can be used in the fixed mode to verify whether the object is accurately positioned. In the floating mode, the contour comparison is variable along the laser line. It is not necessary to position the parts to be tested in exactly the same way.

Quality assurance: definition of tolerances

The similarity between the reference and the target object is provided as a value between 0 and 100%. The 'threshold' function can be used to define the value from which the reference object is no longer acceptable. Hence, a low tolerance value will guarantee the quality of assemblies that require great accuracy.

IO-Link provides for information on detected object profiles and reject rates to be transmitted easily.

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Opportunities in the 4IR space

Yanesh Naidoo, Sales and Design Director at Jendamark Automation, spoke at the NSTF Discussion Forum on Advanced Manufacturing and Automation last year. He looked specifically at the opportunities for South African companies in the 4IR space. More recently he was invited to present a paper at the United Nations conference in Geneva, Switzerland, which considered the impact of 4IR on society.

Leigh Darroll caught up with Naidoo to discuss his views on what he describes as the huge opportunities that 4IR opens up for South Africa and on the African continent, the importance of avoiding an attempted 'copy and paste process' from the developed world, and the chance for Africa to take a leadership role in developing African solutions which would in turn be exportable. This is already happening.

Jendamark Automation designs and builds production lines in two areas of the automotive sector: powertrains and catalytic converters. The company builds lines that meet requirements not only for South Africa but for anywhere in the world. Exports have included a differential assembly line for General Motors and a fully autonomous production line for catalytic converters in the Netherlands, among many others.

Jendamark is a South African company, established 25 years ago, with its head office in Port Elizabeth, a key hub of the South African automotive industry. It employs 320 people. The company today has an international footprint with an office in India, which it opened three years ago based on expected growth of the automotive industry there and responding to India's focus on reducing carbon emissions. The small company that was initially acquired employed some 20 people; currently 220 people are employed in the Indian office. Several years ago, Jendamark opened a sales and service office in Germany so it could interact with customers in their own language and culture. The service division of the company was established to provide support, which is also the basis for the office in the USA. A sales component is to be developed in the USA in the near future.

A demo session with Jendamark's Odin software set up at a workstation and use of augmented reality glasses to share work instructions for building parts.

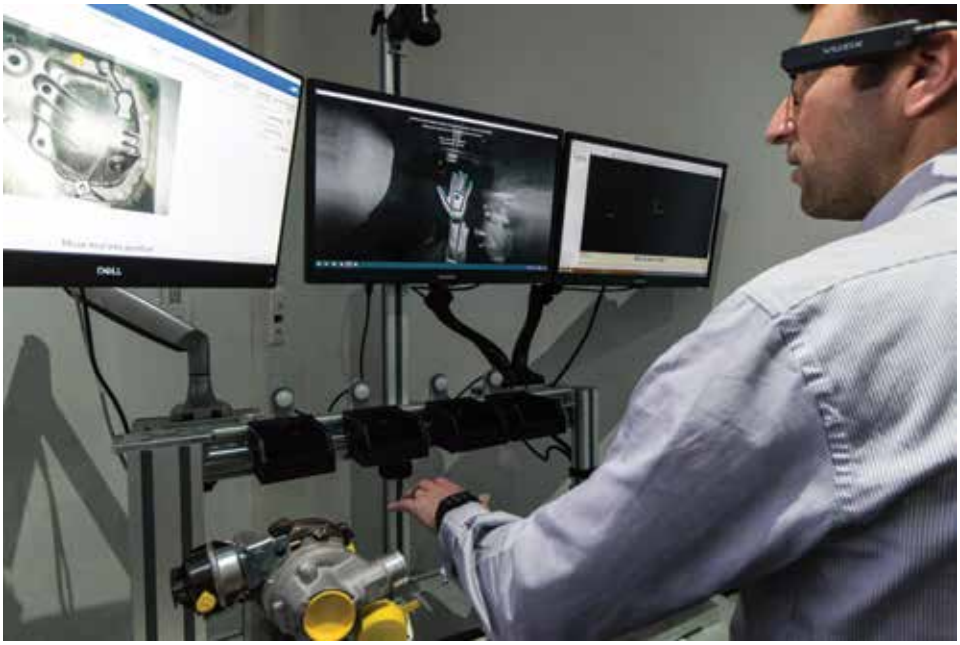
The production lines designed by Jendamark are built in South Africa and 95% of all the machines are exported. Naidoo says, anywhere in the world where there is an automotive hub, there are machines that were built in Port Elizabeth.

With this background, Jendamark is well established in the production line business, but the company realised in planning for the fourth industrial revolution (4IR) that future opportunities are likely to be in the digital services domain.

Naidoo says that while Jendamark has proven capabilities and recognised expertise in the design, engineering, manufacturing and commissioning of automotive production lines, it expects such production lines will become commoditised. "For us, it's important to stay at the innovative edge of our sector, so we will continue to produce automotive production lines and at the same time we will be looking to use digital solutions to increase efficiencies for our customers and to deliver more value.

"This is where digital technologies like data collection, artificial intelligence, machine learning and predictive maintenance become valuable. Just as we develop these services for our existing customers, they apply equally to other machines – so such digital solutions open up new markets for us, not only in the automotive sector but in the manufacturing sector at large, in South Africa and internationally."

Naidoo comments on how the automotive sector is evolving. There is a great deal of discussion about electric vehicles but, in his view, the introduction of electric vehicles



At a glance

- Jendamark, which is recognised internationally for its expertise in designing automotive production lines, is using digital technologies to deliver more value for its customers – and others in the wider manufacturing sector.
- It is developing new business streams based on 4IR technologies.
- Naidoo strongly believes that Industry 4.0 cannot be adopted as a direct import from the developed world to Africa. "Africa has other challenges… We should instead be using new technologies to address our own problems and create African solutions."

Jendamark has developed software to create animated work instructions for machine operators and this is now being used locally and internationally.

is taking place more slowly than is portrayed in the media and there are still relatively few in the market. (According to the International Energy Agency's *Global Electric Vehicle Outlook for 2019 – GEVO 2019*, sales of electric passenger vehicles passed the 5 million mark in 2018 and are accelerating fast.[i])

He says major manufacturers are working in this domain mainly to compete with Tesla – and to respond to the emerging eco-conscious market and demands for climate action. As a company Jendamark realises that it might be too small to influence the market, but it is still essential for it to be involved. It has therefore targeted some electric vehicle products. For example, about three years ago the company developed the production line for an electric tuk-tuk in India – the production line was designed in virtual reality and built in India.

Naidoo notes that there are some significant differences in the design and engineering of production lines for electric vehicles compared to those for conventional ICE (internal combustion engine) vehicles, particularly for the battery assembly and motors. "We are nonetheless exploring the possibilities and, like other players in this new manufacturing sector, we are learning as we go."

Naidoo also makes the point that while e-mobility very often gets bundled up with 4IR, it's important to distinguish these two revolutionary thrusts. They overlap really only in respect of energy efficiency, energy storage, climate action, emissions reduction, and by coincidence of timing, but their respective scope and application focus are quite distinct.

He suggests that the impact of autonomous vehicles, ride-sharing, transport-on-demand and related options, which are driven by connectivity and control technologies networked with payment and financial services technologies, will have a greater impact on the transport market than e-vehicles. "One of the main reasons for this shift is that many young people today do not want to own a car, it is no longer aspirational. We expect to see new car sales declining quite significantly in future."

Industry 4.0 in Africa

Naidoo strongly believes that Industry 4.0 cannot be adopted as a direct import from the developed world to Africa.

The term is often poorly understood and loosely used to encompass seemingly all new technologies. Going back to its origins, he explains that Industrie 4.0 emerged from Germany in 2011/12. The Fraunhofer-Gesellschaft, Germany's national applied research organisation, was contracted to investigate opportunities for greater efficiencies in manufacturing – in part to advance competitive manufacturing costs and specifically to address concerns around Germany's (and Europe's) declining populations. In Germany, there are not enough young people moving into the workplace to take up the roles of the country's highly qualified but aging manufacturing workforce.

The solution proposed by Fraunhofer was the Industry 4.0 Plan, now known as 4IR, and it is centred on further advancing automation and taking people off the production line. In countries like Germany that are already comprehensively industrialised and widely automated, this will lead to the transfer of blue-collar jobs to robots, which will address the German/European challenge of declining populations.

"But Africa has other challenges," Naidoo emphasises, "and these need to be understood in order to share in Africa 4.0. Solutions developed to address African problems are then also potentially exportable to other parts of the world facing similar challenges."

He points out that South Africa and other developing countries – in Africa and elsewhere – face exactly the opposite population picture. "We have a massively

The company has also developed software that allows for management and workers to communicate via the screen that the workers look at all the time: for example, a manager in Germany and operators on a production line in India, can interact on various matters, at any time.

growing population and a burgeoning youth population – without adequate skills. We also have a government with diminishing resources so there is less government money to subsidise industrial development or support skills training.

"These are the main reasons why we should not attempt to copy and paste the 4IR model – developed by and for the developed world – in South Africa, Africa, or the developing world. It simply will not work for us. We shouldn't even be trying to catch up with the steps the developed world has taken.

"We should instead, be using new technologies to address our own problems and create African solutions. In my view, this is the prime opportunity that 4IR offers us. Africa and African companies can take a leadership role in this arena.

"In SA our aim must be to retain jobs, increase employment and elevate skills levels. So while 4IR will likely see the loss of some blue collar jobs, new technologies, with the requisite skills and reach and entrepreneurial vision, open up possibilities for creating new markets and new economies. We need to use technologies, to solve the problems that we face – in industry, in manufacturing, as well as in education, transport, housing and other sectors.

"If we consider for a moment the jobs and opportunities that a company like Uber has opened up (without any government subsidies) globally, within the space of a few years, or that new technologies have brought to the financial services sector – as well as the benefits of making banking accessible to more people, at lower cost, we can see that the connectivity enabled by new technologies opens up new possibilities. It creates new jobs, requiring new skills, replaces previously familiar roles and increases the number and range of opportunities available. We need to consider completely different ways of working and we need to think differently to see the opportunities."

Using digital technologies in production line training

At the NSTF (National Science and Technology Forum) Discussion Forum last year, Naidoo outlined some examples of ways in which Jendamark is already using digital technologies to advance its own operations.

"We are aiming to bring humanity back to manufacturing. Where previous industrial revolutions have made robots out of people, we are aiming to use technologies in a more human way.

"People are involved in the efficient running of a production line, and it is important to try to make everyone involved, from the operator to the manager, more efficient at what they do. Training is central to this.

"Some time ago, it was found that the only requirement to become a machine operator in South Africa was a matric certificate. This assumed that applicants could read and thus build an engine from the instructions provided, which was not the case. Pictures are easier for operators to follow, and animated work instructions customised for the field in which they work are considered an even better option. Jendamark has developed a software product to create animated work instructions. This was intended for third world operators, but it is now being sold mostly to first world companies – because everyone follows pictures better than words. This is just one example of a solution to a South African challenge that has become a successful export product.

"Another is in the use of augmented reality glasses which we have introduced for workers on the production line. The use of these glasses removes the constraint of having to work in a position where the screen with the instructions is visible. Being able to move freely increases the productivity and efficiency of operators.

"From a human resources perspective, training on the production line and engagement between management

The virtual reality training machine that Jendamark has developed presents a simulated environment that allows machine operators to walk through different processes, to learn and understand the steps involved.

and operators are important considerations. In order to ensure that management can communicate important information to the workforce, Jendamark has developed software that allows for management and workers to communicate via the screen that the workers look at all the time. In this way, interaction can take place between a manager in Germany and operators on a production line in India, and the messages can include training matters, among others.

"Jendamark has also designed and built a virtual reality training machine which, in a simulated environment, allows operators to walk through different processes to understand the steps involved. This facility can be valuable in training and upskilling operators and a new business stream will be created developing content for virtual reality machines. Such digital solutions to existing problems on the production line can create new revenue streams for companies working in this space."

At the business management level

Taking a wider view, Naidoo says, "A production line consists of the line itself and above this an enterprise resource planning (ERP) system. There is a bucket above the production line that collects valuable data, which is useless unless analysed by software. The data could, for instance, assist with the ongoing challenge of absenteeism, which currently involves a potentially time-consuming manual intervention. Instead, the system could trigger automatic responses and call up standby personnel, greatly reducing downtime on the production line."

Noting that production line designers and builders are not best placed to provide the analysis of the data from the bucket system to their customers, he says Jendamark has appointed a specialist small start-up company to design an application to streamline this and other issues. Companies such as this small start-up do not have access to large customers using production lines, but by working with companies like Jendamark, a viable ecosystem is created for all concerned and this becomes a potential export product.

Naidoo emphasises the exponential value of such ecosystems and says that South African companies need to work together rather than competing against one another, especially as many opportunities are outside the country.

Major trends impacting industry

Looking ahead he sees two major technology trends impacting on industry. "Firstly, companies have the opportunity to learn more from current production by analysing long-term data to deliver greater efficiencies. The information is there, we need to use it.

"Secondly, there is a growing demand for customisation of production – in the automotive sector, in fashion and footwear, in home appliances as well as many other sectors. This will only continue to grow and will see modular production replacing mass production through the years ahead."

Beyond manufacturing, Naidoo says, "Problems can become opportunities if viewed differently. We have the opportunity to use 4IR technologies to address many of the challenges that South Africa and Africa are facing, and we need to develop the skills at the same time."

He recognises that all new ideas, new technologies and initiatives will bring their own challenges and unexpected outcomes. "We need to approach these openly – to generate new solutions."

[i] *https://www.iea.org/reports/global-ev-outlook-2019*

1800	***Industry 1.0*** *– water and steam power are used to create mechanical production lines*
1900	***Industry 2.0*** *– electricity lets us create a division of labour and enables mass production*
1950/2000	***Industry 3.0*** *– information technology systems automate production lines*
2010 + NOW	***Industry 4.0*** *– IoT and Cloud technology automate complex tasks and accelerate efficiencies.*

(By courtesy of Jendamark)

A unified network for future Smart Manufacturing

John Browett, General Manager of the CC-Link Partner Association-Europe, looks at key aspects of time-sensitive networking that will change global industry, and what to consider when adopting this technology.

The smart factory is conceived to deliver ever-increasing efficiency and productivity. By providing a continuous stream of data flowing across an entire enterprise and beyond, it is possible to monitor and manage manufacturing processes in real-time. Time-sensitive networking (TSN) technology is bringing what was on the horizon for Smart Manufacturing closer by offering an increasingly holistic approach to industrial communications today.

Connectivity is a crucial requirement in the digital transformation currently taking place in the industrial landscape, and it will become increasingly prominent.

Standard industrial Ethernet has served manufacturing industries well for a long time, evolving over the years to address new challenges and requirements in industrial communications. However, some of its features are becoming obsolete, hindering businesses in adopting Industry 4.0.

Only a new technology, built around the needs of Smart Manufacturing, the Industrial Internet of Things (IIoT) and Big Data, can successfully address this issue. Time-sensitive networking – TSN – as defined by IEEE 802.1, provides a migration path to the future for current industrial Ethernet.

Fundamentally, the creation of a responsive and transparent cyber-physical enterprise requires high-level systems to monitor, control and make decentralised autonomous decisions on all process operations. The most elegant way to achieve this is by using one single industrial network to provide the necessary convergence of information technology (IT) and operational technology (OT). In practice, only a few companies have this luxury. Typically, any given plant will have many different types of networks, as installations take place over time and according to different needs. TSN can address this issue by offering the possibility to unify multiple different industrial Ethernet protocols on the same network infrastructure.

These capabilities are enabled by the set of IEEE 802.1 standards that define TSN. Key among them are 802.1AS and Qbv. These, respectively, define the synchronisation of devices on a network and control the prioritisation of traffic. In this way, TSN technology ensures that vital process data is handled in a reliable and deterministic manner, while also allowing lower priority traffic to coexist on the same network. This offers productivity benefits and it lowers cost of ownership associated with the network infrastructure.

The removal of any physical separation between critical and non-critical data sharing simplifies network planning and reduces capital expenditure and operating expenses associated with cabling and network administration.

A lot of attention has been focussed on the fact that TSN allows 'standard' Ethernet to be deterministic. While this is true, TSN only addresses the data link layer of Ethernet. It does not consider higher level functions typically addressed by industrial Ethernet protocols, such as safety and motion control. Consequently, users looking for a migration path to future industrial communications also need to consider how TSN can be combined with these needs to ensure high performance and functionality.

Furthermore, as a series of open IEEE technical standards that device makers can currently pick and mix, TSN ensures openness and future interconnectivity among technologies adhering to the same IEEE 802.1 sub-standards. The IEC/IEEE 60802 working group is currently building on this, creating a set of profiles for using TSN in automation to ensure standardisation.

Revolutionising the manufacturing sector

The opportunities and benefits of TSN have the potential to contribute to improving manufacturing processes and increasing businesses' competitiveness. In the long term, they will transform the global manufacturing industry. Major players in the factory automation business such as Mitsubishi Electric have already introduced a range of products that support TSN. The concept is becoming a reality and represents a real step forward in the evolution of industrial networking.

The unprecedented level of connectivity offered by TSN will help to connect different 'islands of automation' within a production plant into one independent and self-coordinated 'living system' that is responsive to many variables, including fluctuating inputs and scheduled events.

In fact, the cyber-physical systems that TSN can support are not confined to automation but can be extended to asset management and predictive maintenance. For example, when combined with OPC UA, TSN provides an efficient and reliable network for the transfer of high-quality, real-

Time-Sensitive Networking (TSN) technology is bringing what was on the horizon for Smart Manufacturing closer by offering an increasingly holistic approach to industrial communications today.

world data on the performance of physical machines and their virtual counterparts. As a result, it is possible to create highly accurate and responsive real-time digital twins[1].

Key considerations in adopting TSN technology

As a key enabler for Industry 4.0, TSN will likely become a must for industrial communications in the near future. Development teams from different disciplines, from IT and engineering design to manufacturing and logistics, should start researching and planning the implementation of this technology in their industrial communication networks.

Looking at TSN offers a good chance to assess in-house systems and find a migration path to address future needs. A parallel emerging trend is the growing need for increased bandwidth to handle the 'explosion' of data that Industry 4.0 is generating. As TSN is also being linked with the trend towards gigabit Ethernet, any assessment needs to combine TSN and gigabit Ethernet.

Taking all this into account, two key points become clear. Firstly, industries should consider what open network technologies are available to help them migrate current industrial Ethernet systems to TSN compatibility. Secondly, they should check if these solutions can offer gigabit bandwidth.

The CC-Link industrial Ethernet IE TSN will address both these requirements. It is the first open industrial Ethernet technology that combines TSN compatibility with gigabit bandwidth. By choosing technologies like this, businesses can benefit from solutions that address current and upcoming connectivity needs, offering scalability and flexibility as well as future backward compatibility.

At a glance

- Typically, any given plant will have many different types of networks, as installations take place over time and according to different needs. TSN offers the possibility to unify multiple different industrial Ethernet protocols on the same network infrastructure.
- In fact, the unprecedented level of connectivity offered by TSN extends its application beyond factory automation to asset management, predictive maintenance and other cyber-physical systems.

[1]Source: https://avnu.org/wp-content/uploads/2014/05/TSN-Business-Impact-paper-FINAL.pdf

Balluff takes up CC-Link IE TSN opportunities

Automation specialist Balluff foresees the role CC-Link IE TSN will play in creating a highly connected network of devices communicating in a deterministic way and interfacing seamlessly with IT and higher-level management systems.

As a global automation player Balluff offers high-end sensors, connection solutions and related products. Key technologies it uses include RFID systems, fieldbus network blocks, cables and IO-Link, the technology for connecting peer-to-peer sensors, actuators and other systems and components to a controller.

IO-Link is one of Balluff's principal product ranges and already includes models that are compatible with CLPA's open network technologies, CC-Link fieldbus and CC-Link IE open gigabit Ethernet. The company is now looking to the future of industrial communications to address the needs of Industry 4.0 applications.

John Browett, General Manager, CLPA-Europe, says, "Today's market requires the integration of devices, such as vision systems, with a higher demand for bandwidth. The capability to provide vertical integration from machine networks into IT infrastructure is also in high demand, so to be able to manage both, efficiently, on the same network is a big step forward.

"With CC-Link IE TSN technology, it is possible to deliver smart integration from core machine control through to IT communications – on the same network. That means applications with very fast cycle times can coexist with devices using the TCP/IP protocol, for example. Simpler physical networks that are smart in operation mean easier integration and less complex support."

TSN offers automation specialists the opportunity to create flexible, converged systems for the Smart Factory of the future. With CLPA's CC-Link IE TSN technology, device makers and end users can benefit from a technology that will provide a way to handle the mass of data that characterises Industry 4.0 applications, and the merging of IT and OT.

Balluff's commitment to CLPA technologies is further demonstrated in the fact that the company is a CLPA board member and has been involved in promoting their global acceptance. Manuel Solano of Balluff says this commitment has also benefitted the company. "We share our experiences and insights with other CLPA members, well-known in the automation industry and we have the opportunity to strengthen relationships with our customers and our competitive position."

Cloud engineering for efficient IoT automation

PC-based control offers a central, open and comprehensive machine control platform ideal for delivering highly efficient, IoT-based automation strategies. It enables machines, plants and production lines to be connected in ways that unlock their full efficiency potential across entire processes. In this context, TwinCAT Cloud Engineering adds a new dimension by providing users with a means of engineering TwinCAT instances and controllers in the cloud.

With TwinCAT Cloud Engineering, users can instantiate and use existing TwinCAT engineering and runtime products directly in the cloud. Easy to access from the Beckhoff website with a web browser and requiring no additional software, the new solution enables registered users to work with the TwinCAT development environment, even from previously unsupported devices such as tablet PCs.

The TwinCAT Cloud Engineering instances generated by users can be connected to physical control hardware over a secure transport channel. Users have all the advantages of the TwinCAT control architecture as well as distributed collaboration support through a source control repository. For new users in particular, having access to a TwinCAT Cloud Engineering instance in the cloud provides an ideal and comprehensive foundation on which to get to know the TwinCAT environment.

In addition, TwinCAT Cloud Engineering enables users to move their entire TwinCAT architecture to the cloud, the only difference compared to a conventional TwinCAT environment being that they use a virtual machine instead of a local engineering PC. One advantage is that users need not get used to a new software environment but can simply continue to work in the same, familiar development environment. Another is that they do not have to install and maintain multiple software versions tailored to specific machine generations on their own PCs. Instead, users can run separate TwinCAT Cloud Engineering instances with different software versions, all of which they can access remotely whenever they need to. Project files are stored in a source code control repository which can be accessed directly from within TwinCAT Engineering.

The system provides for efficient team collaboration and with modern source control features, connecting to Git-based systems and managing automation projects on them is easy. The TwinCAT multi-user functionality enables simple, seamless access to a source control repository without the need for special technical expertise. Here, TwinCAT Cloud Engineering enables multiple users to work together on a number of instances at the same time, either by integrating a Git server into the instance or using a Git-based cloud service.

With TwinCAT Cloud Engineering, globally distributed control systems in Industry 4.0 environments are easy to operate and maintain remotely.

For more information contact Beckhoff Automation.
Tel: +27 (0)11 795 2898
or email: press@beckhoff.co.za

Integrated technologies offer more efficiency and flexibility

With innovations and the integration of cutting-edge technologies into its Digital Enterprise portfolio, Siemens helps companies from all sectors to achieve more flexible and environmentally efficient production. Klaus Helmrich, Member of the Managing Board of Siemens AG and CEO of Digital Industries, said at SPS 2019: "The Digital Enterprise portfolio is already well established globally in industries implementing Industry 4.0. Many applications demonstrate the tangible benefits of these solutions for our customers. Now we are taking the next step."

Siemens has introduced a number of innovations and sector-specific applications that respond to new requirements in industry. For example, a more precise and powerful digital twin helps to reduce CO_2 emissions in product development by providing the comprehensive simulation of real production. The analysis of production processes highlights potential savings for resources such as water and power. And the use of innovative production methods, such as additive manufacturing, can save materials and prevent waste. With this portfolio, Siemens is paving the way for modular, highly flexible and environmentally efficient production flows.

Increasing requirements for greater flexibility and productivity cannot be met through conventional automation solutions alone. An integrated, scalable system is required from production to the Cloud. The technical prerequisites for this are already available in the form of end-to-end solutions across the value chain for discrete and process industries. Seamless connectivity between the virtual and the real world is achieved using platform innovations such as Sinumerik One, the first digital-native CNC system; the innovative web-based process control system Simatic PCS neo; the newly developed visualisation platform Simatic WinCC Unified and the Xcelerator portfolio, which combines the full spectrum of industry software, services and Siemens MindSphere IoT operating system with an extended Mendix platform for the development of low-code apps.

The trend towards flexible and modular production also creates challenges for wireless communication: more devices, greater reliability and lower latency. The communications networking of production and logistics elements is key. Industrial 5G provides the basis for this as it offers ultra-reliable broadband transmission and ultra-low latency for networks with a large number of devices.

Another step in implementing digital transformation is the growing ecosystem for Industrial Edge and Cloud. This enables the integration of data from data analysis on the shop floor, through the automation system, to the Cloud. In this regard Siemens offers new Edge apps for machine tools. It has also acquired Edge technology from US company Pixeom, strengthening its portfolio for easy app management and central device updates, even on distributed infrastructures.

For more information visit Siemens at:
www.siemens.com

'Industrial IoT Company of the Year' three years running

Global automation technology and engineering company, Emerson, has been named the 'Industrial IoT Company of the Year' by IoT Breakthrough for an unprecedented third consecutive year.

The honour recognises Emerson's commitment to helping customers in industries such as chemical, life sciences, power, and oil and gas, define and execute a practical and successful path to digital transformation. Emerson recently introduced a dedicated digital transformation business that combines its leading sensing technology, operational analytics and broad services capabilities to deliver targeted digital solutions to customers' challenges.

IoT Breakthrough, which received more than 3 700 nominations for the 2020 competition, recognises companies, technologies and products worldwide that set themselves apart in IoT categories ranging from industrial and enterprise, to consumer and connected home. Winners are selected by a panel of senior-level professionals experienced in the IoT space, including analysts and technology executives and journalists.

Industrial Internet of Things (IIoT) capabilities can enable a stepchange in performance, but many companies do not have a clear path to get there. A recent survey by Emerson showed more than 70% of companies do not have a vision for data analytics with a clearly defined roadmap to success. Emerson's new digital transformation business brings together critical resources and its existing expertise in consulting, project execution, smart sensor technologies, data management and analytics, to help manufacturers develop and implement pragmatic digital transformation strategies.

Stuart Harris, Group President for Emerson's digital transformation business, said, "The IIoT space is crowded and can be confusing, so the goal of this organisation is to help customers achieve measurable business improvement through a focused strategy and relevant technologies. This award reinforces our leadership in capabilities which are proven to deliver measurable results."

To help customers realise the promise of digital transformation, Emerson's Plantweb™ digital ecosystem is highly scalable, enabling companies to focus on priority areas and tailored to their business needs and readiness. This is critical because, according to the same Emerson survey, only 26% of respondents are scaling digital transformation pilots, hindering the potential of new technologies to enable wide-scale improvement.

Emerson continues expanding its Plantweb capabilities through strategic partnerships, investments and innovation, building a comprehensive operational analytics portfolio. Together, these resources are helping guide customers to the digital transformation strategies and programmes that accelerate top performance.

James Johnson, Managing Director at IoT Breakthrough, said, "The industrial IoT market is inundated with confusing promises and complex issues as organisations look to embrace innovation and new technology while leveraging their existing investments. Emerson is 'breaking through' the crowded market as an industrial automation leader by focusing on partnering with their customers from start to finish, helping them define and execute a practical and successful path to digital transformation. Emerson's most recent developments open up the promise of IIoT to businesses that may otherwise not be able to navigate the digital transformation process and we are pleased to name Emerson our 2020 Industrial IoT Company of the Year."

For more information email: Devesh.Roopnarain@Emerson.com

Increased decoding capabilities in barcode readers

The iVu BCR Series from Turck Banner adds the Code 93, GS1 DataBar, and PDF417 barcode types to the broad spectrum of supported barcodes. This opens up new opportunities for iVu BCR Series barcode readers to solve applications in the postal, pharmaceutical and inventory management sectors where these barcodes are widely used. The iVu BCR Series supports the barcode types listed below.

1D and stacked barcodes	
Codabar	Code 39
Code 93 (new)	Code 128
EAN-8	EAN-13 (UPC-A)
GS1 DataBar (new)	IMB
Interleaved 2 of 5	PDF417 (new)
Pharmacode	Postnet
UPC-E	
2D barcodes	
DataMatrix (ECC200)	QR and Micro QR

The improved algorithms included in Vision Manager 1.8.0 (firmware 2.6.0) enhance the decoding capabilities of the iVu BCR Series, enabling a higher rate of good reads on damaged, distorted and other difficult-to-read barcodes. This minimises disruptions on the line, reduces product loss and ensures reliable data collection and improved traceability throughout the supply chain.

iVu BCR Series barcode readers solve a wide range of track and trace applications for the automotive, electronics, packaging, materials handling, food, beverage, and pharmaceutical industries, as well as others. Common applications include:

- Device/component traceability
- Direct part marking (DPM)
- Quality assurance
- Work-in-progress tracking
- Automated line changeover
- High-speed process control
- Package sorting and shipping
- End-of-line-palletising
- Primary and secondary package verification.

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Enhanced decoding capabilities in the iVu BCR Series of barcode readers address applications across a range of industry sectors.

Electrical schematics via the cloud

Design software and services solutions provider EPLAN recently launched eBuild, the new cloud software for generating electrical schematics or fluid power schematics. It is geared towards users of EPLAN Platform 2.8 who want to take their first steps into the cloud environment. They can simply register in the EPLAN ePulse cloud system and go ahead with the new freemium software.

As part of the EPLAN ePulse cloud-based services, EPLAN eBuild opens up completely new possibilities in engineering. It introduces a new working method – appropriate to use in the cloud environment – and is designed for easy use. Users who work with the EPLAN Platform can get started easily, with no training or comprehensive introduction required.

Once registered with EPLAN ePulse, users can open a project, select the tasks – and the software configures electrical schematics based on EPLAN Electric P8, (or fluid power schematics based on EPLAN Fluid).

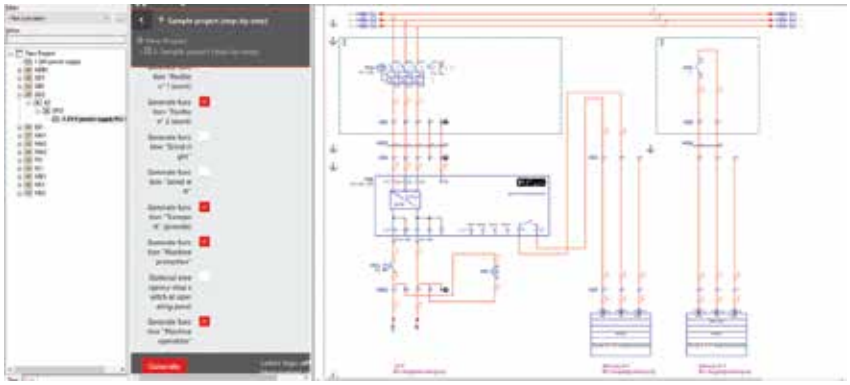
EPLAN Vice President Cloud Business, Hauke Niehus says, "With EPLAN eBuild, our customers get a simple and powerful tool that enables initial project planning in the cloud environment. It enables our customers to generate schematics automatically for standard circuits, using stored macro libraries, and thus save considerable time and drawing work when planning automation systems."

One of the particular benefits of EPLAN eBuild is that it supplies stored macros for entire electrical and fluid power schematics rather than providing data for individual devices or components. Because it includes the corresponding logic and variance, it speeds up the design process enormously and is said to be more exciting to use in terms of smart operability. Moving forward, users will be able to focus on their core tasks and the onerous 'copy-and-paste' methodology will become a thing of the past.

Another benefit that EPLAN is passing on to customers is a better quality of documentation building on previously tested schematic templates. The libraries will be successively expanded and EPLAN is currently in discussions with numerous component manufacturers in this regard. The goal is to achieve the widest possible availability of configurators in order to maximise the positive user experience on ePulse and because data is being provided to users via the cloud, keeping the data up to date is much easier.

EPLAN provides software and service solutions in the fields of electrical, automation and mechatronic engineering. It has developed one of the world's leading design software solutions for machine and panel builders. EPLAN works with its customers to streamline challenging engineering processes. It uses standardised and customised interfaces to ERP and PLM/PDM systems to ensure data consistency along the value chain. EPLAN is part of the owner-operated international Friedhelm Loh Group.

For more information contact Johan Reyneke at Eplan Software & Service. Tel: +27 (0)11 609 8294 or email: Reyneke.J@eplan-software.co.za



Eplan eBuild makes the configuration of electrical schematics easy – this example shows the complete configuration of a grinding machine.

New network manager software

Phoenix Contact's new FL Network Manager Version 3.0 can be used to start up, monitor and update Phoenix Contact network components. The latest version has extended the software to include topology representation and the SNMP (simple network management protocol) scripting function.

For a network to operate reliably, the network components need to be configured correctly and to be connected to one another accurately. The new topology representation enables the device connections for each network port to be checked and visualised. It is therefore possible to determine whether the actual network structure corresponds to the planned structure. In addition, topology representation allows the configuration of the redundancy protocols to be checked.

The use of different colours makes it easy to grasp important information at a glance, such as the roles of the individual ports and devices in the redundancy system and the resulting redundant paths. SNMP scripting enables more in-depth diagnostics to be performed on the network structure, in the event of an error, for example. In addition, Version 3.0 of the Network Manager allows the SNMP parameters of any device in the network to be read and written.

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Aiming for 100% renewables in breweries

SAB and AB InBev Africa are aiming to use 100% renewable energy at all their breweries in South Africa and across the continent by 2025. Leigh Darroll attended the launch of the renewable energy programme at the Chamdor Brewery on 16th January, which marked the start of this multi-billion rand investment.

All SAB and AB InBev Africa's breweries in SA – seven sites nationally – will have onsite solar power facilities installed by the end of January. These will partially power each brewery and represent 7% of the business's electricity requirement. In terms of carbon emissions reductions, the installation is equivalent to taking about 2 000 vehicles off South Africa's roads. It will also allow for all electricity used in the production of the company's global brand – Budweiser – which is championing the renewable energy drive and is produced at the Rosslyn Brewery north of Pretoria, to be sourced from renewable energy.

AB InBev's global commitment is to achieve 50% of the the group's purchased electricity from renewable energy sources by 2020 and 100% by 2025.

Speaking at the launch, Taryn Rosekilly, VP Sustainability & Procurement at SAB and AB InBev Africa, said, "We've achieved our 50% target in key markets around the globe ahead of schedule and we are well on track to achieve our 100% ambition, with good progress being made in Africa."

SAB and AB InBev Africa have partnered with the SOLA Group which is currently handling installations of the solar photovoltaic energy supply systems at all the breweries around the country This will see some 8.7 MWp installed initially. The SOLA Group brings together solar project development and financing expertise, as well as turnkey EPC (engineering, procurement & construction) and operations and maintenance solutions. It works with utilities and industrial and commercial clients across Africa.

Jonathan Skeen, General Manager, Gauteng, for the SOLA Group, said all the SAB and AB InBev Africa sites have the space and scope to establish a higher level of solar PV renewable energy but this is constrained by current regulations which limit renewable energy supplies to 1MW per site. Skeen explained that the partnership agreement will see the SOLA Group retaining, managing and maintaining the installations and SAB AB InBev Africa will be billed for the energy they use, at an agreed tariff. This has proven to be an effective basis for power purchase agreements that the SOLA Group has in place with other customers.

At the launch of the renewable energy programme SAB and AB InBev Africa also showcased the first electric truck to arrive on South African shores: the eCanter, designed and manufactured by Mitsubishi Fuso Truck and Bus Corporation (MFTBC), part of the Daimler Group's global commercial vehicles business. Boasting zero emissions, the 7.5 tonne FUSO eCanter is the first of its kind in the world.

At a glance

- AB InBev's global commitment is to achieve 50% of the group's purchased electricity from renewable energy sources by 2020 and 100% by 2025.
- Its seven breweries in South Africa will have onsite solar power facilities by the end of January. Further phases of the programme will entail the installation of renewable energy solutions on land adjacent to the breweries to supply them directly, and remote installations which would require wheeling agreements to supply power to the breweries.

The vehicle has a battery capacity of 82.8 kWh and a distance range of 100 to 120 km. It is currently operating in customers' hands in a number of countries, including Germany, Japan and Portugal, and has been brought to South Africa by FUSO Trucks for customer demonstrations. The showcasing of the vehicle at Chamdor points to SAB and AB InBev Africa's ambitions over the medium- and longer-term with regard to clean energy and sustainability.

The group is working on a Pan African Renewable Energy tender, which would seek to source the equivalent of 440 MW of solar capacity to meet its 2025 target in Africa. This represents an initial investment of some R5.6 billion (US$396 million) for installation at its facilities, which would

Installation of solar PV panels in progress at the SAB Chamdor Brewery, west of Johannesburg.

be invested by the business's development partners, with a further R12.4 billion (US$866 million) in energy cost that would be committed by AB InBev over a 20-year period.

The implementation will consist of three phases, beginning with onsite solar installations with a capital investment of around R1.1 billion. Once maximum capacity onsite has been achieved, renewable energy solutions will expand to identified sites in the vicinity of the breweries.

- Phase 1 represents onsite solar installations
- Phase 2 entails renewable energy solutions installed on land adjacent to the breweries, which would be hard wire cabled to the breweries
- Phase 3 will involve offsite renewable energy solutions, which would comprise remote installations and require wheeling agreements to deliver the power to its breweries.

In line with the above, SAB plans to migrate one of its South African facilities to 100% renewable energy supply by the end of 2020, one of the first of its kind in the country. The multi-faceted solution will encompass a wind and solar energy mix, a wheeling arrangement and energy banking.

Outside of its breweries, in the surrounding communities, SAB and AB InBev Africa plan to provide access to clean and affordable energy to around 80 000 people. Renewable energy micro-grid solutions will provide power to consumers at a significantly lower cost than current solutions. This process will be delivered and managed through a blockchain solution.

IRENA calls for renewed commitment to increase renewable energy NDCs

At the UN Climate Change Conference (COP25) held in Madrid in December last year (2019), International Renewable Energy Agency (IRENA) released its latest report – *NDCs in 2020: Advancing Renewables in the Power Sector and Beyond* – urging countries to raise their renewable energy ambitions significantly and adopt targets in the next round of Nationally Determined Contributions (NDCs) that will really transform the global energy system. The report shows that NDCs would need to more than double by 2030 to put the world in line with the Paris Agreement goals, reaching 7.7 terawatts (TW) of globally installed capacity by then. Current renewable energy pledges in terms of the NDCs fall short of this, targeting only 3.2 TW.

The report states that with over 2.3 TW installed renewable capacity to date, almost half of the additional renewable energy capacity foreseen by current NDCs has already been installed. The analysis also highlights that delivering on increased renewable energy ambitions can be achieved cost-effectively and with considerable socio-economic benefits around the world.

"Increasing renewable energy targets is absolutely necessary," said IRENA's Director-General Francesco La Camera. "Much more is possible. There is a decisive opportunity for policy makers to step up climate action by raising ambitions on renewables, which are the only immediate solution to meet rising energy demand while decarbonising the global economy and building resilience.

"IRENA's analysis shows that a pathway to a decarbonised economy is technologically possible and socially and economically beneficial," La Camera continued. "Renewables are good for growth, good for job creation and deliver significant welfare benefits. With renewables, we can also expand energy access and help eradicate energy poverty – in line with the UN Sustainable Development Agenda 2030. IRENA will promote knowledge exchange, strengthen partnerships and work with all stakeholders to catalyse action on the ground. We are engaging with countries and regions worldwide to facilitate renewable energy projects and raise their ambitions."

IRENA's view is that NDCs must become a driving force for an accelerated global energy transformation. The current pledges reflect neither the past decade's rapid growth nor the ongoing market trends for renewables. Through higher renewable energy ambitions, NDCs could serve to advance multiple climate and development objectives.

For more information or to download the report visit: https://irena.org/

Electricity supply options for industry

Against the background of South Africa's constrained national power supply, inadequate electricity supply infrastructure, increasing urbanisation, and growing demand for electricity, Hendrik van Huyssteen, MD of Energas, says cost-effective solutions are available. Electricity can be generated efficiently by gas-powered generators. The cost of gas is generally much lower than that of diesel and various gas options can be considered.

At a glance

- Gas-fuelled generators offer industry a cost-effective power supply option.
- In South Africa, piped natural gas and compressed natural gas are available to industry in some regions of the country. The Rovuma Basin find off the north coast of Mozambique offers a potential source of liquefied natural gas and is expected to have positive spinoffs for South African business.

Piped natural gas

In Johannesburg, East Rand and Centurion natural gas pipelines reach many areas. A methane-rich gas pipeline runs from Secunda to Emalahleni (Witbank), to Durban and from Durban up to Richards Bay. Piped gas is available from Sasol, Egoli Gas and Novo Gas.

Compressed natural gas

Compressed natural gas (CNG) is natural gas compressed into bottles at up to 250 bar. It is available from suppliers in KwaZulu-Natal, Johannesburg/East Rand and Emalahleni (Witbank). CNG can be delivered in a radius of 200 to 300 km from the base station. The cost of CNG is generally higher than that of piped gas as it has to be compressed into bottles, transported and then pressure reduced at the end-user.

Liquified petroleum gas

LPG is a mixture of butane and propane and has a high energy content. It is retailed in bottles up to 48 kg and is also available in larger volumes, stored in underground or above-ground tanks. LPG is generally more expensive in Rand per gigajoule than piped gas or CNG.

The Schmitt Enertec Energin CHP engine container.

Liquified natural gas

LNG is abundantly available on the world market and is used in large volumes, but is not yet available in South Africa. LNG is natural gas that is cooled down to very low temperatures, when the gas becomes a liquid. LNG has a higher energy density than CNG and is generally more highly priced due to the costs of cooling and then regassifying it.

An LNG production plant is to be built in northern Mozambique following the significant Rovuma Basin find, around mid-2019, off the country's north coast. This could provide a source of LNG for South African industry and is expected anyway to have positive spin-offs for South African business.

Biogas

Biogas is a type of biofuel that is naturally produced from the decomposition of organic waste. When organic matter, such as food scraps and animal waste, break down in an anaerobic environment (an environment without oxygen) they release a blend of gases, primarily methane and carbon dioxide. Biogas is produced at various plants in South Africa and can be used to fuel gas generators.

Wood gas

Wood gas is a syngas fuel which can be used as a fuel for furnaces, stoves and vehicles in place of petrol, diesel or other fuels. It can also be used in gas generators.

Energin gas engines

All the gases noted above can be used to fuel Energin gas engines from Schmitt Enertec. These are supplied in South Africa by Jet Park-based Energas Technologies. Schmitt Enertec, which is based in Germany, specialises in gas-powered engines from 140 kW to 500 kW.

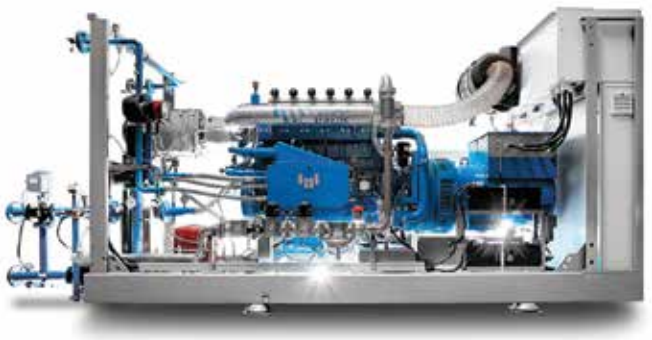
A 12-cylinder Energin engine running at sea level can produce 500 kW electricity at an efficiency of 42.1% running on natural gas or CNG, 42.7% on biogas; and can produce 450 kW running on LPG at an efficiency of 36% and 250 kW using wood gas at an efficiency of 35%.

The heat of the engine jacket water can be recovered through an engine-mounted heat exchanger to produce hot water, which can be used in domestic applications. An Energin engine producing 500 kW electricity can produce 255 kW free thermal power, delivering an overall efficiency of 63.6%.

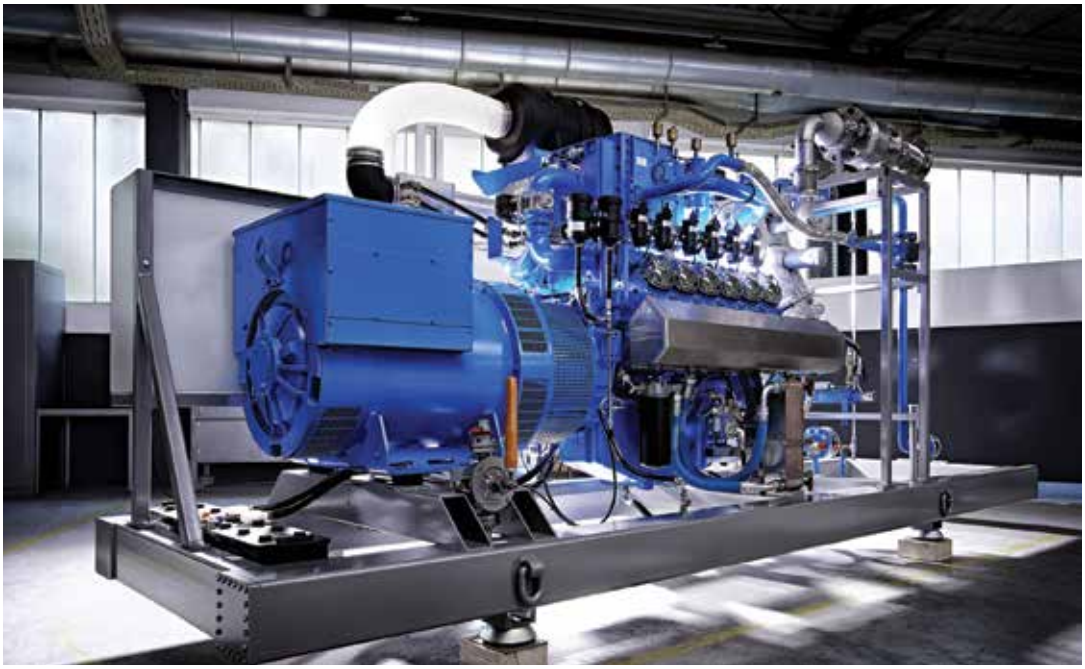
More heat can be recovered from the exhaust gas to push efficiency up to 87.5% and producing 539 kW thermal power. The Energin CHP (combined heat and power) engine is equipped with all the pumps and heat exchangers on a base frame. This engine can also be combined with absorption chillers to use the heat for air-conditioning in a process called tri-generation. This is ideal for hospitals and clinics, shopping complexes, or other facilities, especially where grid power is not available due to limited infrastructure. The overall running cost is very competitive and, if required, steam can be produced using the exhaust heat.

Energin engines can be supplied with an optional sound enclosure mounted on the base frame. This reduces the engine noise to a level below 70 dB at one metre's distance.

Equipped with a control unit several engines can be run in parallel mode, either without a grid connection or in synchronisation with the grid. The engines can be monitored remotely and require an oil service only after 2 000 hours (three months running 24 hours a day).



Fitted with a control unit, several Energin engines can be run in parallel.



The Energin CHP engine, equipped with the required pumps and heat exchangers, is supplied on a base frame.

New storage solutions for hybrid micro-grids

DHYBRID – specialist in hybrid power plants – is enhancing its hardware and software portfolio with micro-grid-optimised lithium-ion storage solutions. The new storage systems work seamlessly with DHYBRID's Universal Power Platform (UPP), which controls the interaction of solar systems, storage units and diesel generators in local power grids. In combination with the UPP, the storage systems allow for a truly uninterruptible power supply. Such supply is necessary when, for example, computers or devices must be prevented from losing power during problems with the grid. This sets the solution apart from a conventional storage-supported backup power supply, which can still sometimes experience brief interruptions.

Hybrid micro-grids present special requirements for storage systems. Unlike conventional energy systems, hybrid micro-grids must be able to switch seamlessly between different energy sources. This also changes the master and slave roles in the system and places special demands on the control system and on storage-relevant components such as the battery inverter.

CEO of DHYBRID, Benedikt Böhm, says, "We adapt the configuration of our storage systems individually to each project in order to optimise them for the respective micro-grid. We use data from more than 70 projects that our team has been working on in more than 20 countries. The UPP, which orchestrates the components in the system, ensures the necessary flexibility and a technology-agnostic approach."

DHYBRID's new storage solutions are installed in 10-, 20- and 40-foot air-conditioned containers and can be monitored using a SCADA system with VPN access. This makes them particularly suited to guaranteeing supply security in areas with no grid connection or with a challenging climate. The storage capacity is between 100 kWh and several MWh.

The systems use high-quality lithium-ion cells from manufacturers such as Samsung and LG, depending on the performance required as well as the area of application. These manufacturers also provide battery management to ensure safe control of the battery cells and modules to the highest standard in all operating states. The integrated battery inverter, too, is custom-planned and configured for each project.

In South Africa

The new storage system can be seen in use at the Cheetah Plains Lodge in South Africa's Kruger National Park. This particular system has a capacity of 1 MWh and works together with three solar installations with a combined output of 300 kW and a 150-kVA diesel generator. It supplies the lodge's micro-grid with three-phase electric power. DHYBRID's UPP is used to monitor and control all important grid parameters and enables automated operation of the system. The project was undertaken in collaboration with DHYBRID's local partner Blockpower.

DHYBRID, headquartered in Munich, Germany, provides renewable and hybrid energy systems internationally – for islands, industry and utilities. The company offers turnkey solutions and individualised control systems for hybrid energy projects. It combines conventional energy supplies such as diesel generators or utility grids with renewable energy systems and storage technology as well as comprehensive customised control systems.

For more information contact Marja Anacker at DHYBRID, email: m.anacker@dhybrid.de, or visit: www.dhybrid.de

The DHYBRID storage system in a 20-foot container.

Container installation of energy storage and control systems for the hybrid power plant at Cheetah Plains Lodge, Kruger National Park.

1 MWh capacity: the lithium-ion storage system in an air-conditioned 20-foot container.

Modular offgrid power for Malian gold mine

Technology group Wärtsilä recently announced the first order of its new Modular Block power generation solution – and the first signed in terms of its partnership agreement with Aggreko, UK-based global provider of mobile, modular power, temperature control and energy services. This will see four Wärtsilä Modular Block enclosures, each with one medium-speed Wärtsilä 32 engine, delivered to Resolute Mining's Syama gold mine in Mali, to deliver 40 MW of power, off-grid.

The Wärtsilä Modular Block solution will replace the existing diesel generators currently powering the mine. With its high efficiency engines the new solution will create substantial monthly savings in fuel costs. In addition, fast-starting and load-following capabilities will facilitate the integration of renewables into the mine's energy system – providing for a reliable, flexible and affordable solution which will help to reduce the mine's environmental impact.

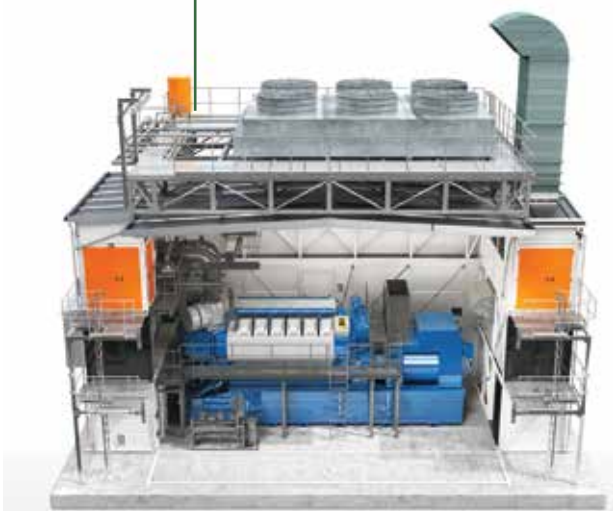
Three Wärtsilä Modular Blocks, providing a total of 30 MW of power, are to be installed this year next to the existing power station. The fourth 10 MW Modular Block will be installed in 2022. The agreement with Aggreko includes an option to add a fifth 10 MW unit to the power plant. The scalability of the Wärtsilä Modular Block solution enables the mine to increase its onsite power capacity if needed to support the future growth.

Stephane Le Corre, Strategy and Development Director at Aggreko, says: "The Wärtsilä Modular Block supports our technology investment strategy. When included as part of a hybrid solution, it has enabled us to offer Resolute an extremely cost-effective solution for 16 years."

From Wärtsilä's perspective, "The Wärtsilä Modular Block solution opens up exciting new opportunities for permanent and rental electricity generation," says Jean Nabb, Director, Strategic Partnerships, Wärtsilä Energy Business.

Aggreko is working at the forefront of a fast-changing energy market and is focused on solving its customers' challenges to provide cost-effective, flexible and greener solutions around the globe.

For more information, contact Wärtsilä Energy Business, email: christophe.demay@wartsila.com or visit: www.wartsila.com/energy



The Wärtsilä Modular Block is a prefabricated, modularly configured and expandable enclosure for sustainable power generation.

Bankable energy efficiency projects

Ahead of the South African Energy Efficiency Confederation (SAEEC) Conference in November last year (2019), the South Africa-German Energy Programme (SAGEN) in collaboration with the Department of Mineral Resources and Energy and SANEDI, and the German international development and cooperation agency, GIZ (Gesellschaft für Internationale Zusammenarbeit), hosted a pre-conference workshop presenting a guide to preparing bankable energy efficiency projects.

Barry Bredenkamp, General Manager for Energy Efficiency at the South African National Energy Development Institute (SANEDI), looked specifically at the 12L tax incentive for energy savings.

The 12L tax incentive in South Africa's Income Tax Act, 1962, invites businesses to implement energy efficiency savings and provides a tax-saving allowance for those that do. Bredenkamp explained that it was originally offered for three years, until 2020, before the Minister of Finance Tito Mboweni extended it until 31 December 2022.

"This extended window should encourage businesses and industry to be more energy-efficient in their operations and reduce their electricity bills. We have been called on by government during this time of constrained electricity supply to do all we can to reduce energy usage. This incentive offers customers the multiple benefits of reducing their electricity bills, improving their carbon footprint and earning a rebate on their tax returns, while helping the country work within its energy constraints.

"We have seen more than 200 applications to date and with this extension of the rebate we expect to see double the number of applications," said Bredenkamp.

He highlighted that there is a calculator on SANEDI's website where companies can check the feasibility of applying for the incentive. 'This will give them an indication of what the benefits would be and they can then decide whether or not to proceed with their applications," he said.

SANEDI

The South African National Energy Development Institute (SANEDI), established by government, directs, monitors and conducts applied energy research to develop innovative, integrated solutions to catalyse growth and prosperity in the green economy. It drives scientific evidence-driven ventures that contribute to youth empowerment, gender equity, environmental sustainability and the 4th Industrial Revolution, within the National Development Plan (NDP), through consultative, sustainable energy projects.

For more information, visit: www.sanedi.org.za

Barry Bredenkamp, GM Energy Efficiency at SANEDI.

Capex-free solar a smart option for business

Eskom supplies 95% of South Africa's electricity and as the national utility battles its own instability, power shortages and policy uncertainty remain a continuing threat to business and economic growth in the country. It remains to be seen how the newly appointed CEO, André de Ruyter, can work with government (as the sole shareholder) and his colleagues to stabilise the energy provider. One thing is certain, power will not be getting any cheaper. Solar power has now become a viable, if not an essential option for business as capital investment costs decrease and solar providers compete to offer solutions.

International solar energy company, SolarSaver, has taken the approach of offering its clients solar photovoltaic solutions on a rent-to-own basis, eliminating the need for any capital investment on the part of clients. Customised systems are designed and installed free of charge and clients then only pay for the cheaper, greener power that is produced.

SolarSaver has to date invested over R250 million in installations across Namibia and South Africa and now manages the largest fleet of self-financed rooftop installations in southern Africa, with clients from fuel stations to manufacturing businesses to large shopping centres. While most of SolarSaver's business was initially in Namibia, substantial investment backing from the Pembani Remgro Infrastructure Fund (PRIF), a US$302 million private equity fund established by Remgro Limited and Phuthuma Nhleko that focuses on infrastructure and energy-related investments in Africa, has allowed the company to grow its South African portfolio substantially as well.

Tim Frankish, Managing Director of SolarSaver notes that with South Africa's electricity prices having increased by over 350% in the last decade, a solution that reduces this operational cost is very attractive to businesses. "Our solar tariffs are significantly cheaper than the relative cost of grid power, so our clients get to start saving on their electricity bills from day one," says Frankish. "Our rates then only increase in line with CPI inflation, so clients' savings grow each year as grid tariffs increase significantly beyond that."

SolarSaver also remains responsible for all ongoing monitoring, maintenance and insurance of the pv systems. "It's in our interest to ensure that the photovoltaic systems are operating at peak performance and that translates into better savings for our clients.

"We like to think of SolarSaver as offering 'capex-free, hassle-free' solar solutions," says Frankish.

While initial solutions focus on daytime power generation through grid-tied solar, SolarSaver is already starting to update existing systems to include batteries as that technology becomes more cost-effective. "Our long-term goal is to provide our clients with 24-hour power solutions through fully-financed, customised solar-battery systems," says Frankish. "We're not looking to sell expensive quick-fixes – we're offering to invest our own capital to provide them with long-term solutions. Grid-tied solar doesn't solve load-shedding issues, but we believe that by partnering with businesses and investing with a long-term view, we can provide a real alternative to Eskom."

SolarSaver provides customised rooftop solar photovoltaic solutions to corporate and industrial customers in Namibia and South Africa through its proprietary zero-capital financing model. To date it has completed over 130 projects most of which are managed in terms of rent-to-own contracts. Installations include systems for shopping centres, service stations, hotels, hospitals and factories. Sedgeley Energy is the technical services provider to Solar Saver and is responsible for the installation, administration and maintenance of the rental portfolio.

For more information visit: www.solar-saver.net

SolarSaver provides customised rooftop solar photovoltaic solutions to corporate and industrial customers in Namibia and South Africa on a rent-to-own basis.

Adding power to the national grid

As world leaders gathered in Madrid, Spain, for the UN Climate Change Conference (COP 25) in December last year (2019), in South Africa the contractors and project partners involved in the development of Ilanga 1, the concentrated solar power plant that forms part of Karoshoek Solar Valley Park near Upington in the Northern Cape, celebrated the first anniversary of the plant's operation – supplying clean energy to the national grid.

The engineering, procurement and construction (EPC) contractors: a consortium comprising COBRA, SENER and EMVELO; the owner: Karoshoek Solar One, an IPP; the lenders and other key project partners were all there to mark this milestone.

The concentrated solar power (CSP) plant contributes 100 MWe of on-demand power that is clean, sustainable and reliable. The plant has no fuel costs and emits no harmful emissions, ensuring its low carbon footprint. It is equipped with a patented molten salt storage system that allows five hours of energy storage, enabling it to continue producing electricity when there is no sunlight.

The commissioning of the plant by the EPC contractors consortium has not only brought light and power to local residents in Upington and surrounding areas, it has also created employment opportunities here.

The solar thermal power plant went into commercial operation in November 2018, within the timeline scheduled under the Power Purchase Agreement (PPA) signed between Karoshoek and Eskom. The plant continues to make a considerable contribution to the national grid and is an example of a success in the government's Renewable Energy Independent Power Producer Procurement (REIPPP) Programme. With renewed pressure on the national power supply system, additions such as this are especially welcome.

Pedro J Cuevas, Chairman of the EPC consortium and representative for COBRA in Africa, explained: "This project – Ilanga 1 – was conceptualised in 2009, before the IPP Programme was launched, by our local partner EMVELO, with the support of some of the key players in South African industrial development, the IDC (Industrial Development Corporation) and DBSA (Development Bank of South Africa). COBRA entered into an agreement with these partners to co-develop the project. Our technology partner, SENER was incorporated into the consortium forming the design, supply and construction of the plant.

"The combination of technological know-how, con–struction background and local expertise provided the consortium with the resources to make the project a success. We believe that the economic impact of this project has exceeded the expectations of all the parties involved."

Siyabonga Mbanjwa, Regional Managing Director for SENER Southern Africa, said: "This is a historic moment in South Africa's energy transition as another renewable energy power plant, supplying reliable and sustainable energy, is operating with a notable set of results and achievements. Providing energy for around 100 000 homes and saving some 90 000 tons of CO_2 each year, over 20 years, is a considerable achievement.

"Solar energy has a huge role to play in South Africa. This project demonstrates the results that the renewable sector can achieve and the possibilities that exist, particularly when our climate realities are taken into account and when selecting energy sources for the country and continent.

"Alongside our contribution to securing power, we are also pleased to make a social impact in developing South Africa's first black-developed CSP plant, with the resulting skills development, job creation and local economic development that this project delivered. We continue to combine the provision of power with positive social and environmental outcomes," Mbanjwa added.

The members of the EPC contractors' consortium are involved in the construction of solar plants worldwide and in South Africa they have already assisted in the production of more than 400 MW of installed capacity in three solar thermal power plants and four photovoltaic power plants.

Ilanga 1 in Upington, Northern Cape, South Africa, is a 100 MWe thermo-solar plant with 266 loops, built using SENERtrough® parabolic troughs designed and patented by SENER. The plant has a thermal storage capacity of 1 250 MWth, five hours, in the form of a molten salt storage system. Construction started in 2015 and the plant was completed in 2018.

For more information visit www.southernafrica.sener

The Ilanga 1 concentrated solar power plant near Upington, Northern Cape. The solar field stretches over 335 ha with a total reflective area of 869 800 m².

Seven strategies to maintain electrical distribution equipment

Schneider Electric says that plant managers should employ and strategically schedule a variety of practices to maintain electrical distribution equipment in order to ensure personnel safety, protection of goods and equipment, service continuity, energy efficiency and efficient spare parts management. This also optimises the total cost of ownership of the plant's power infrastructure.

The company suggests that the equipment manufacturer's expertise is important to all maintenance practices and says that the different strategies used will achieve different levels of impact in the potential benefits.

Why maintain electrical distribution equipment?

Consistent and effective maintenance of electrical distribution equipment will ensure:

- Increased safety: protecting people, equipment and goods
- Enhanced availability: maximising service continuity
- Efficient performance in aging assets performance: capex optimisation
- Cost efficiency: opex optimisation.

Without maintenance, industrial facilities are susceptible to emergency shutdowns that raise premium purchase costs for spare parts and labour as well as process shutdown costs (including no production, ramp-down/ramp-up of production, and waste product).

However, these are only the visible operating costs; maintenance also helps ensure that equipment operates energy efficiently.

Using the manufacturer's expertise

Modern and up-to-date maintenance practices have become a key competitive advantage when they are used in early detection, identifying problems before they require a major repair.

Professional maintenance executed by highly qualified technicians offers businesses the opportunity to optimise total cost of ownership (TCO) and both capex and opex, creating more value by enhancing plant and equipment availability at lower operating costs.

When maintenance is delivered by a manufacturer, the annual TCO tends to be lower because the useful service life of equipment is extended. Such services also provide preventive, condition-based (on-demand or continuous) monitoring and predictive (condition-based with advanced analytics) maintenance practices that improve equipment reliability and reduce the need for costly corrective maintenance and unplanned outages that result from equipment failure.

Types of maintenance

- *Corrective maintenance* - a run-to-failure approach that simply lets equipment run until something breaks.
- *Preventive maintenance* - carried out at periodic and predetermined intervals or according to prescribed criteria and intended to reduce the probability of failure or the degradation of the functioning of an item and consequent, costly, immediate, corrective intervention. Preventive maintenance can be categorised at three levels, according to execution complexity: exclusive maintenance activities; advanced maintenance activities; and basic maintenance activities.
- *Condition-based maintenance* - the goal is to enhance equipment reliability, keeping it as close to its optimum condition as possible. It's the extension of preventive maintenance with testing and analytics (equipment condition diagnosis) and/or continuous monitoring and the ensuing maintenance actions.
- *Diagnostics* - equipment diagnostics entails an assessment of the core functions of the equipment that includes functional testing on kinematics, electric parts and electronics. It is a complementary and effective solution to onsite condition-based maintenance, particularly when critical equipment serves highly demanding downstream processes that require high levels of availability.
- *Predictive maintenance* - the optimum maintenance management strategy to minimise unscheduled downtime and reduce the overall cost of maintenance, as well as providing peace of mind over electrical distribution infrastructure. It represents the application of the just-in-time (JIT) principle to preventive maintenance.
- *Reliability-centred maintenance* - a new model to operate electrical distribution infrastructure in the context of digital factory solutions, from ideation to operation, with comprehensive facility modelling. Today, this new paradigm is reserved for greenfield industries with critical continuous processes built under a disruption-free specification, because shutdown penalties impact business sustainability.
- *Value-based maintenance and asset management* - this considers the key benefits of maintenance, the drivers to create economical added value on existing equipment. Once the sources of potential value creation are calculated, the organisation can select the best mix of maintenance practices.

Schneider Electric recommends that plant managers should not implement just one practice, but should rather take advantage of the maintenance options that will deliver best value for them.

Stress corrosion cracking on induction motor rotor

ACTOM division LH Marthinusen (LHM), a leading repairer of transformers and large rotating machines and manufacturer of specialised transformers, recently completed a failure analysis and repair on a large induction motor rotor. Boris Breganski, Electrical Engineer at LH Marthinusen, explains the findings of the analysis.

Construction materials do not have an infinite life span and in some cases fail prematurely when conditions conducive to this present themselves. One such material failure mechanism is stress corrosion cracking, which can occur in susceptible materials due to a combination of applied stress and a corrosive environment.

LHM has recently repaired a 6-tonne induction motor rotor in which stress corrosion cracking had occurred on the laminations.

The motor was sent to the LHM works for a general overhaul. On inspection, it was observed that some of the ventilation finger plates were protruding from the surface perimeter (*Image 1*). The rotor had a core length of 1 850 mm stacked with individual, insulated, laminated steel sheets. The individual laminated sheets were stacked in batches, separated by ventilation finger plates. The laminations and finger plates were individually manufactured from a single sheet and not as a segmented configuration. Based on the manufactured single sheet configuration, the observed plate protrusions could only have occurred if the sheet material had fractured.

As there was a high risk that these protruding plates would dislodge and damage the stator during future operation, an agreement was reached with the client to unstack the rotor core.

Upon unstacking of the rotor core, cracking of the sheet material was observed on both the coated lamination steel (*Image 3*) and the ventilation finger plates (*Image 2*). It was noted that the laminated steel plates with the material fractures were adjacent to the ventilation finger plates. From this it was deduced that the ventilation air contained certain contaminants or gaseous compounds which had reacted with the sheet material, causing the observed corrosion.

It was further noted that the coating of the lamination plate (electrical steel) was discoloured in areas below the bottom of the rotor bar slot and around the circumference where it fitted onto the shaft (top sample in *Image 3*).

Samples of the fractured lamination material were sent to a metallurgical laboratory for analysis. The metallurgical laboratory undertook the following analyses on the provided samples:

- Metallographic examination
- Scanning electron microscopy examination
- Hardness test
- Coating discolouration test under elevated heat conditions
- Material chemical analysis.

The hardness test results were compared to a sample of imported lamination coated steel and no abnormalities were found. In addition, the hardness test was done on both the discoloured and non-discoloured areas, with results showing that the discolouration did not affect the material's properties.

A section of the coated plate sample was heated to 150°C for 30 minutes with no indication of discolouration. Thus it was concluded that temperature did not affect the coating and the discolouration was more a result of a chemical reaction. This was as expected as the coatings have a temperature capability, in air, ranging from 180°C to 230°C, depending on the manufacturer.

A metallographic surface replica was lifted from one of the cracks and a cross-section was cut from one of the sample plates. The metallographic examination revealed that the cracks were intergranular in nature with a branched appearance (*Image 4*). The discoloured cross-section revealed that heating had no visible effect on the microstructure which consisted of non-orientated, mostly polygonal, grains of ferrite.

The scanning electron microscopy (SEM) examination on a section of material with cracks – and specifically the cracked areas – yielded interesting results. It revealed high levels of sodium (0.41 wt%) within the cracks, which is typically associated with caustic soda (NaOH). The coatings of the lamination plate showed a non-continuous flaky appearance.

A chemical (wet) analysis was performed on each sample of the cracked and the imported lamination materials. Comparative results showed that the composition of elements for both the cracked and imported lamination materials were similar. However, the chemical analysis of the coating showed that the imported lamination steel had a phosphate base, whereas the cracked material showed no sign of phosphate. As lamination steel coatings are the proprietary intellectual property of the respective manufacturers and specifications of the chemical

At a glance

- When a 6-tonne induction motor was sent to LH Marthinusen for a general overhaul, inspection revealed otherwise unseen damages that indicated material failure on the rotor. This meant the rotor core had to be unstacked and the rotor re-cored, as part of the repair and maintenance work.
- From a comprehensive analysis of the rotor component materials, it was concluded that the failure had resulted from stress corrosion cracking.

composition are not publicised, no determination could be made on the lack of phosphate in the fractured material.

Based on the analysis and test evidence it was concluded that the failure mechanism of the material that led to the cracking of the lamination plate was stress corrosion cracking (SCC).

The three conditions required for stress corrosion cracking were evident in this investigation with (i) the stress caused by the outward radial force (centrifugal) due to the spinning rotor body; (ii) a corrosive environment (sodium found in the cracks) and (iii) susceptible material (deterioration of the coating exposing the alloy material to the environment).

Finally, it is noted that the presence of sodium hydroxide in certain chemical plant processes creates a corrosive environment for certain materials and may result in SCC material failure mechanisms.

The rotor was re-cored using the highest quality coated lamination steel available and returned to service.

ACTOM (Pty) Ltd offers manufacturing, service, repairs, maintenance, project management and distribution of electro-mechanical equipment and is one of the largest service providers in its sector in Africa. It operates through 35 outlets across southern Africa. ACTOM is also a major local supplier of electrical equipment, services and balance of plant to renewable energy projects and it holds numerous technology, distribution and value added reseller agreements with various partners, both locally and internationally.

Image 1: It was observed that some of the ventilation finger plates were protruding from the surface.

Image 2: When the rotor core was unstacked, cracking of the sheet material was observed on both the ventilation finger plates (shown here) and the coated lamination steel (Image 3).

Image 3: The coating of the lamination plate was discoloured in some areas (as shown in the top sample).

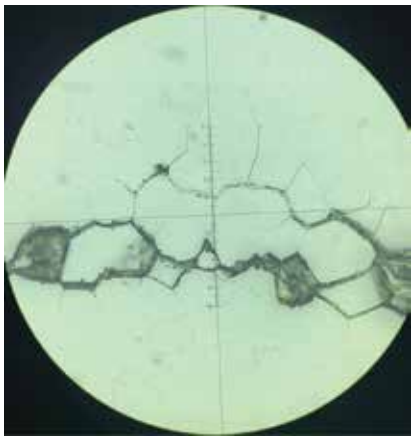


Image 4: The metallographic examination revealed that the cracks were intergranular, with a branched appearance.

Accurate thermal imaging supports efficient maintenance

Leading an industrial maintenance team requires a combination of communication skills, industry knowledge and technical expertise. Implementing standard work and a preventive maintenance programme is more than just good for business – it also aligns the team with a common goal of keeping the plant up and running safely and efficiently. Choosing the right tools can make a significant difference in the success of such programmes.

Comtest has introduced Fluke's new Ti300+ infrared camera which helps maintenance teams to find issues before they actually become problems, thus reducing unexpected breakdowns and supporting efficient repair work.

The Ti300+ has the resolution and accuracy needed to reveal temperature differentials clearly or demonstrate progressive heat changes over time. With LaserSharp™ AutoFocus the Ti300+ ensures focused images, every time. With the touch of a button, the built-in laser distance meter calculates and displays the distance to the designated target on the camera screen and takes the image in focus. Most importantly, temperature readings from in-focus images are highly accurate. Furthermore, the Ti300+ enables the team to get clear images with touchscreen simplicity, while maintaining a safer distance from operating equipment.

Features include:

- 320 x 240 resolution
- Measures up to 650°C
- Engineered and tested to withstand a 2-metre drop
- Manual or automatic focus.

Used with Fluke Connect desktop software for connectivity, the Ti300+ can generate professional reports in minutes, while efficiently capturing full radiometric data to support the maintenance programme. The software enables users to:

- Edit and optimise images
- Combine infrared and visible images for simpler analysis
- Create detailed reports
- Access thermal images from cloud storage
- Organise and search images by asset, severity and title.

Users need to know the equipment and understand the subtle difference between normal and abnormal operating temperatures so that they can recognise when the thermal images are illustrating that there is a variance. The Fluke Ti300+ thermal camera with LaserSharp AutoFocus makes it easy for users to capture accurate thermal images consistently and it is rugged enough to capture quality infrared images even if it gets dropped.

For more information contact Comtest.
Tel: +27 (0)10 595 1821
email: sales@comtest.co.za

The Fluke Ti300+ thermal imaging camera makes it easy for users to capture reliably accurate images.

Fast-track repair on ArcelorMittal turbine generator

A 40 MW turbine generator from ArcelorMittal's Vanderbijlpark works was repaired by ACTOM Turbo Machines on a fast-track schedule.

Emergency repairs were required after the generator broke down in October 2018, with damage including failed bearings on the generator train. ACTOM Turbo Machines, a division of ACTOM (Pty) Ltd, undertook to complete the work and have the generator back in operation by mid-December 2018.

Demonstrating its high level of expertise as a mechanical repairer, ACTOM Turbo Machines first diagnosed all the elements that would require attention. All four bearings, as well as the rotor sealing elements, were found to be damaged. Other damage, which was unrelated to the October failure, was also discovered.

Danie Bloem, ACTOM Turbo Machines' Project Manager on the contract, says, "This involved a crack on the high-pressure (HP) gland section of the main steam casing." Further unforeseen irregularities uncovered included a malfunction in the starting or auxiliary oil pump and an incorrect bolt clearance on one of the HP palms, probably due to faulty installation.

"In addition to repairing the damaged bearings, we had to recondition a spare set of bearings that ArcelorMittal had in reserve," Bloem adds. "The sealing segments were replaced with new ones manufactured at our Sasolburg works."

He notes that the process of repairing the crack in the main steam casing took the team five days, working around the clock. A high level of welding expertise was required here, as the casing is made of a special material.

The repair of the starting oil pump was also completed fast, in just two days. This required the manufacture of a new shaft as well as the reconditioning of the mechanical seals.

Bloem points out that once the generator was put back into operation, vibration testing confirmed that its performance had improved significantly.

For more information contact Marthinusen & Coutts.
Visit: www.mandc.co.za

ACTOM Turbo Machines technicians (from left) Louis Claasen, Jacques Zandberg and Dehan Meyer prepare to work on the 19-tonne rotor of the 40 MW turbine generator, as a rigger guides it into position.

Cableway maintenance

Pragma recently secured Table Mountain Aerial Cableway as a new On Key EAMS (enterprise asset management system) client.

Jean Goussard, Solutions Engineer at Pragma said, "We are honoured to partner with Table Mountain Aerial Cableway's Technical team. We aim to help them ensure that the cableway operation remains in tiptop condition to safely glide up and down Table Mountain, providing tourists with a memorable experience."

A modern cableway is a complex system with diverse components which have varying maintenance requirements and replacement cycles. Apart from the general inherent mechanical demands of such systems, the location of the Table Mountain Cableway presents aggravating factors such as the 'Cape Doctor's' gusting winds, the moist environment from clouds billowing over the mountainside, and the corrosive effects of the nearby Atlantic, all of which contribute to its intensive maintenance programme.

Weather permitting, the Cableway transports 800 people per operational hour from the base station to the top of Table Mountain. The two cable cars each carry a maximum of 65 passengers per trip, a weight of up to 5 200 kg per car, while the floors of the circular cabins rotate to allow travellers to enjoy 360° views.

To best manage these demands and still guarantee the safety of the cableway, an annual shutdown takes place in July/August when scheduled maintenance is performed. For continuous care and regular maintenance throughout the year, the ability to accurately plan, control and execute refined maintenance schedules will further enhance the reliability and availability of this national asset.

For some of the more critical components, the use of modern technologies and tools are key for real-time monitoring of the health of these items. Such technologies will assist with the early detection of potential risks or failures, and data collected in this way can be analysed and used to identify trends that feed into advanced maintenance plans.

Emile Streicher, Executive Manager - Technical at the Cableway says, "The On Key system's superior planning and scheduling functions, along with Pragma's expertise with implementation and support were pivotal in our decision to select it as our enterprise asset management system. In addition, we plan to implement condition monitoring technologies on some of the critical equipment to monitor health and provide in-time warnings should preventative maintenance be required."

For more information visit: www.on-key.com

Pragma is working with Table Mountain Aerial Cableway's Technical team to keep the cableway operation in top condition.

Another world-first in cable glands

The primary function of any cable gland is to anchor the cable securely to an electrical apparatus. Ex d (flameproof) cable glands obviously provide additional safety performance related to protecting human life in hazardous locations. Strict international testing standards (IEC 60079 series) specify such demanding performance requirements for the certification of such glands that, until now, no Ex d/e corrosion-resistant flameproof compression gland on the world market has been certified without some attendant requirements or 'special conditions' of use. All such glands have been certified with a 'special condition' requiring an external clamp on the cable.

Pratley's Marketing Director, Eldon Kruger, says it makes no sense to pay for a cable gland which, because it is incapable of performing its primary anchoring function, requires the special condition of external clamping. In addition, notwithstanding the extra cost, the external clamp itself must comply with IEC 61914 (2009 Ed.1). If it is either not fitted or not compliant, the entire installation would be unsafe and non-compliant. This places unknowing end users at great risk. Even master installation electricians could be excused for missing the small print on instruction leaflets and assuming that a certified Ex d (flameproof) cable gland could simply be fitted to a flameproof enclosure.

For some cable glands, additional special conditions apply and in some cases seem only to complicate installation and maintenance further.

Pratley's new fully certified Ex d/e corrosion-resistant Enviro Compression Gland solves all these complexities.

"It has zero special conditions of use pertaining to its installation and that's a world-first," Kruger points out. "Pratley is well-known in the market for producing world-class electrical termination products. The company takes product performance so seriously that it has a policy statement which says that its products should outperform all others on the world market. This statement is signed by the CEO Kim Pratley and displayed on all Pratley product packaging."

Pratley claims that its new cable gland can be installed almost anywhere on earth: from Group I locations in underground fiery mines and Ex d flameproof environments to the coldest and hottest places on the planet, the gland has been certified for temperatures from -20°C to 95°C. It is also IP66/68 certified and can withstand a continuous depth of 350 m underwater. "That's equivalent to the depth of the North Sea 50 km offshore!" Kruger notes.

The new Ex d/e corrosion-resistant Enviro Compression Gland is made from high tensile brass components encapsulated in a tough engineering plastic, which means it will not crack when tightened. This, combined with Pratley's unique Taper-Tech® internal seal design, ensures safe installation in corrosive environments without damaging the cable or compromising seal longevity due to cable cold-flow. The cable gland is suitable for installation in equipment Groups I, II and III and Zones 1, 2, 20, 21 and 22 hazardous locations. It's also completely oil and grease resistant.

"Our aim was to produce a cable gland for hazardous locations that stands out from the rest and does what a cable gland is supposed to do, without compromising on safety and without any limitations, special conditions or ancillary tools. If you need it in metric thread, NPT thread or stainless steel, we can do that too."

For more information contact Pratley.
Tel: +27 (0)11 955 2190
email: sales@pratley.co.za

Pratley has produced a world-first in its new fully certified Ex d/e corrosion-resistant Enviro Compression Gland.

New dry-block calibrator

Suitable for onsite use, WIKA's new Model CTD4000 dry-well calibrator has been designed for use in the severe conditions of the naval and marine sectors.

Ease of use and a compact and practical design make the robust calibrator unbeatable in industrial processes where the calibration of temperature measurement systems is essential for the control of the process and the quality of the final product. Special attention has been given to reducing the weight and size of this new model and to reinforcing its robustness by using an aluminium body and aluminium and stainless steel for many of the internal parts.

Each calibrator is tested in WIKA's laboratory and calibrated with its references in accordance with the international standard.

The thermal part of the calibrator is made of a metal block heated with resistors or with Peltier thermoelectric modules. In the metal block there is one bore into which the interchangeable insert is placed. With the available standard inserts, the calibrator is versatile and can be easily adapted for the calibration of temperature probes with the most common diameters. Customer-specific inserts and bores are available on request.

For more information contact WIKA Instruments.
Tel: +27 (0)11 621 0000
email sales.za@wika.com

The robust new dry-block calibrator is adaptable for the calibration of temperature probes with the most common diameters.

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Photoelectric sensors for precision edges

One of the numerous processing steps in the manufacture of furniture is smoothing and levelling of veneer surfaces. In this case study, ifm reports how high-performance diffuse reflection sensors are used for contour detection in the processing of veneer top surfaces to ensure the highest quality in the sanding process. The sanding machine in use here is from Heesemann and is used for large furniture panels such as table tops for conference tables.

One of the challenges presented in the sanding process was that the edges of both the outer ends and the cut-outs – where they occur – of the high-quality veneer should not be rounded by sanding. There should be no pressure applied by the sanding shoe segments where there is no veneer underneath. For this reason the contour and cut-outs (if any) of the workpiece are detected during each cycle and transferred to the controller.

Sensors replace mechanics

The scanning of table tops used to present a problem for this longitudinal sanding machine because the scanning was effected by mechanical switches. The table top was detected via levers with rollers and evaluated by an old PLC. The PLC inputs required only a low current of about 1 mA and there were problems with the switching contacts of the mechanical switches which, because they were worn away over time, did not always switch reliably.

Another problem was the detection of the table tops by the rollers. The sanding dust took its toll on the rollers' bearings and this caused the rollers to fail more and more often. As a result table tops were spoiled and could no longer be used. A solution using non-contact detection without mechanical switches was therefore sought.

The company consulted one of its long-standing suppliers, ifm electronic, and found the correct technical solution. ifm provided its diffuse reflection sensors, O6 design, free of charge, for testing in the sanding process. After the tests which specifically assessed the sensor's reaction to dust and to the different colours of the veneers, it was found to meet all the criteria and selected for the process.

In this case the PLC was also completely updated and the sensing of the diffuse reflection sensors was visualised on a 19" display so that any incorrect detection could be seen at an early stage.

At a glance

- In this application, relating to the process of fine sanding of veneer surfaces for large table tops, photoelectric sensors have replaced mechanical switches.
- The sensors detect the contour and cut-outs of the furniture panel and control the up and down movements of the individual pressure shoe segments of the sanding machine accordingly, via a PLC, to ensure precise edges.

The controller receives an image of the workpiece from the sensors and controls the lowering of the individual sanding segments.

Optical contour detection

Now 51 compact ifm 06 diffuse reflection sensors detect the contour and cut-outs of the furniture panel from the front and another 51 from the back, as each panel is moved forward and backwards underneath the sanding belt. Depending on the workpiece geometry and the individual cut-outs, the sensors control the up and down movements of the individual pressure shoe segments via a PLC. This avoids excessive pressure on the edges by neighbouring pressure shoe segments. The results are precise, right-angled edges.

The requirements on the photoelectric sensors that are aligned like a scanner strip are high. Different veneers with light, dark, matt or glossy top surfaces have to be verified reliably without the sensors needing to be adjusted. Simultaneously, the background – that is – the contact area has to be suppressed. Depending on the thickness of the furniture panel this can mean a range of a few millimetres, so sensors with precise background suppression are required.

Small sensors, high performance

Sensor specialist ifm electronic's 06H201 diffuse reflection sensors feature an adjustable range from 2 to 200 mm. The maximum range is colour independent. It applies, for example, to white surfaces with 90% remission and to black surfaces with just 6% remission. The sensors do not need to be adjusted for surfaces of different reflectivity.

The diffuse reflection sensors suppress background interference effectively. Depending on the distance and the degree of remission of the object surface, distances of only a few millimetres can be differentiated reliably. In addition, the background suppression is immune to interference even from highly reflective backgrounds such as stainless steel, or reflections caused by moving machine parts.

The clearly limited round light spot, only 8 mm in diameter (at maximum range), provides a homogeneous light distribution in the light cone. This ensures additional reliability, especially in this application where the sensors are mounted close to each other. The high-performance 06 photoelectric sensors ensure optimum sanding results.

In the sanding process 53 lowerable pressure shoe segments adapt to the surface of the workpiece geometry to prevent unwanted rounding of the edges.

Ifm's 06 diffuse reflection sensors are mounted inline to detect the contour and cut-outs of the furniture panels and control the movements of the pressure shoe segments via the PLC.

From the product developers' perspective

The new Liquiphant point level detector has been developed to meet Industry 4.0 demands.

Endress+Hauser looks at the product development process in its field of expertise and considers some of the factors that inform the best I4.0 developments: particularly responsive to users' needs and exploring the reaches of what is technically possible, applying the principles of the 'critical chain', and functional safety by design. The effort that goes into product development upfront, saves a lot of time in the plant.

How do you invent a product that optimises processes in the plant over the long term? In addition to the traditional approach, Endress+Hauser used what it calls the 'Steve Jobs' method in its development of the Liquiphant, today regarded as one of the most reliable point level detectors in industrial plants.

The most common way of developing new products or product versions is simply by consulting users. Where are solutions needed? What part of daily working life do we want to make easier? These product ideas cater to the customer. They are created based on real needs and provide customers with efficient help. Every measuring device manufacturer relies on this procedure to inform the development of their product portfolios – just as Endress+Hauser does.

However, this is not the only way to decide on the direction for product development. If, in the 1990s, we had been asked if we needed to have online friends or would want to combine our mailbox, phone, calendar and computer into one device, most of us would probably have said not. And while everyone today has their own views on the benefits of these developments, there is no denying that they have irreversibly changed our behaviours and our requirements for intuitive user guidance. Sometimes it's simply the vision that's needed to try out what is technically possible – and the time to test whether it wins users' favour.

A new measuring principle: vibronics

In the late 1970s, Georg H Endress, the founder of Endress+Hauser, had a vision. His goal was to abandon the pitfalls of the capacitive measuring principle and develop an all-metal sensor that would be permanently leak-proof. He did not want to just optimise the existing sensors. He wanted to rethink and deliver a completely new concept for customers. This pioneered a new measuring principle: vibronics for liquids. The Liquiphant, featuring a vibrating metal fork, is still known today as a reliable and durable switch. It works as a solution in practically any application, without calibration to the media. There are currently six million Liquiphant units installed in plants around the world, doing their jobs reliably. The fourth generation of the product, soon to be on the market, will feature Bluetooth, self-diagnostics, verification without the need to remove the device, and a test wizard.

The HoloLens guide

The idea of testing what is technically possible early on is a principle that Endress+Hauser has been following for some time. What is different today, however, is that customers are involved in the process at an early stage and asked for their opinions.

When Microsoft launched the HoloLens smart glasses featuring 'mixed reality', which takes the reality we all see and superimposes a virtual reality, the developers and product managers saw its potential. What if you used it to streamline commissioning, training sessions and maintenance? When Endress+Hauser was working on the initial version of the newly developed VisionBlue application, customer input was received early in the process and affected how the product was designed and what it would actually be used for. It was test customers' opinions that led to the decision to give VisionBlue users a display of a safe route through the Ex zone to the device, all within HoloLens. The virtual reality that is placed over the real image shows the user each step that has to be carried out to set up or maintain the measuring device.

There are currently so many technical possibilities on the horizon that developers are thinking several steps ahead, trying new things and getting customers involved in testing from the start. In addition to the major concepts for Industry 4.0 solutions and the digital twin, there are always small practical products that crop up along the way. One of the latest is an adapter for field devices that allows data to be transferred from the field over WirelessHART or Bluetooth to a cloud for diagnostics or analysis.

Today the idea of developers working in quiet isolation just does not apply. 'Thinking ahead' for customers, in a technical sense, means working with customers to test how much added value everyday applications really have and to see whether there is more potential in the technology than initially considered.

Collaboration with other companies also helps. For example, Endress+Hauser is working with Daimler to support a project at the Technical University of Berlin which involves researching artificial intelligence for production and product development. Daimler and Endress+Hauser are setting up the application cases and validating the methods and tools of the machine-learning algorithms based on specific tasks. In turn, the product developers and design engineers will benefit from the support of artificial intelligence.

At a glance

- There are currently so many technical possibilities on the horizon that product developers are thinking several steps ahead… and getting customers involved in testing from the start.
- By adopting different working methods, developers can deliver innovations that look beyond a first response to customers' needs.

The critical chain

Alongside the major advances in high-tech options, day-to-day work focuses on small-scale optimisations. For example, a certain level measuring device may need to handle future applications at temperatures as low as -52°C, or maybe there is a pressure measuring instrument in need of a high-pressure design. In such cases, the company's marketing department drafts the requirements and the development department creates the design and translates it into technically feasible specifications.

For each product family in level and pressure measuring devices, there are around two billion theoretical product combinations. Endress+Hauser has capitalised on an extremely high variety of product versions from day one and this has enabled the company to offer the best custom solution for each individual application. The company remains true to this principle today. Maintaining such a large portfolio requires optimised organisation to manage everything. The research and development department achieves this by using new methods in product design, including Eliyahu M Goldratt's Theory of Constraints with a focus on the critical chain. On this basis, counterproductive multitasking is avoided. A few selected projects are prioritised and assigned to individuals to focus on. Buffers are built into the schedule for safety, but they are shorter and placed at the very end. This way, those working on the project do not fall victim to the 'student syndrome' of procrastinating for as long as possible and they finish more projects in the same timeframe than they would using the conventional procedure.

This working method requires many people to change their way of thinking. German engineers are famous for their attention to detail, their tendency to experiment and to cram as many technical features as possible into one product. Today there is a greater need for straightforward user guidance and reducing complexity. A lot has changed in development in this respect, too. More software developers are using their eye for detail to create straightforward and intuitive operating concepts. They work according to agile methods like Scrum, which means they develop in short sprints; testing, verifying and optimising quickly.

Functional safety in the design

Measuring devices for safety-relevant SIL applications serve as an example of how the effort put into every detail pays off. Traditionally, plant operators buy measuring devices that are suitable for SIL applications and test them in the actual application – so they are effectively 'proven in use'. The international standard IEC 61508 for functional safety and electronic safety-related systems allows measuring devices to comply with the standard entirely as early as the development phase. The developers design hardware and software in such a way that all types of systematic errors are avoided. The hardware also requires a monitoring system to track any accidental errors that may arise and a calculation for the quantitative probability of error. This allows users to buy 'SIL straight from the factory' along with the corresponding documentation, so they can ensure transparent and traceable production. What costs the developers considerably more in terms of development effort subsequently pays off in a significantly streamlined and more reliable workflow.

The new Liquiphant FTL51

Once the first vibronic point level detector, the Liquiphant is now geared for Industry 4.0. The latest generation of devices delivers Liquiphant's long proven reliability as well as a number of new benefits.

- *Simple commissioning without adjustment for various media*
- *Universal measuring principle for use in all kind of liquids*
- *Maximum safety including real-time diagnosis of corrosion with Heartbeat Technology*
- *Verification without process interruption via Heartbeat Technology*
- *Proof test at the push of a button from the control room or directly at the device*
- *Safety by design: developed according to IEC 61508 for direct use in SIL2 and SIL3 applications in homogeneous redundancy*
- *Bluetooth Technology® access via a mobile device to identify, check status and access documentation*
- *Minimum maintenance effort: The recurrent proof test according to SIL can be carried out at the push of a button without removing the level detector. A simple, guided wizard in the SmartBlue App ensures correct execution.*

Fast switching conductive level switches

The latest Kobold NEK conductive level switches are available from Instrotech. This compact NEK device is a complete, functional unit that reliably monitors the limit level of conductive media, even under heavy process conditions.

Used for monitoring chemical or fresh water tanks or mixing vessels, or for run-dry protection in pumps, the NEK conductive level switches more than meet the demand for efficient and cost-effective measurement technology. The space-saving and robust design means the devices can be integrated readily into existing industrial processes.

The NEK conductive level switch is designed as a complete unit that can be screwed into a tank. The compact housing with process connection has a hexagon and male thread for installation. The device has a protection rating of IP 68 and can operate in temperatures up to 85°C. The NEK switches are manufactured in two different materials: those made of polyphenylene sulphide (PPS) tolerate pressures of up to 20 bar, and those made of polypropylene (PP) tolerate pressures up to 6 bar. Two electrodes made of stainless steel extend into the process. As soon as both come into contact with a conductive liquid, the electronics detect it and output a corresponding switch signal.

The switches are available in 36 and 73 mm installation lengths. The installation depth can be adapted individually by means of an additional protection tube. Installation of the device can be done from the top or from the side of the vessel.

For more information contact Instrotech. Tel: +27 (0)10 595 1831, email: sales@instrotech.co.za

The latest Kobold NEK conductive level switch is designed as a complete, compact functional unit to monitor limit levels of conductive liquids.

Electronic position indicator with integrated industrial Ethernet interface

The Siko AP20 position indicator, available from Instrotech, is equipped to detect spindle adjustments in machines. It displays the corresponding positional data to the operator and transfers it to the machine control system. Simple system integration with contemporary interfaces is all that is required. This ensures shortest downtimes and loss-free data communication between the position indicator and the machine control system.

The compact system is particularly suitable for flexible manufacturing with production machines such as packing, woodworking and printing machines and machines for further processing of printed products. Wherever manual adjustment is carried out on production machines, bus-compatible Siko position indicators can optimise the production process such that costly refitting times during product changeovers are kept to a minimum. Once installed, the position indicators provide 100% process reliability. This means that, during product and size changeovers, incorrect machine settings and the associated risks of damage to tools or batches with defects can be eliminated consistently with the AP20.

In addition to the SikoNET5 and CAN interfaces already available, Siko is extending the control system integration options on its AP series to include the most common industrial Ethernet-Fieldbus interfaces, such as Profinet, Ethernet/IP, EtherCAT and Powerlink. It can therefore be integrated easily into almost any current control system from a wide range of manufacturers and without any other accessories. Compared to a converter solution, the variety of components is reduced, as is the space required in the machine. This gain in flexibility ensures stable communication between the machine control system and position indicator, in particular for systems that run a complex production process and for which, as a result, a large number of sensors or long cable lengths are required. Two M12-D coded bus connections for a bus line design that protects the cable mean that star-shaped wiring to the control system is no longer necessary.

In order to meet the requirements of Industry 4.0 and the smart factory of the future, the AP20 goes beyond the exchange of operational process data to include intelligent diagnostic options. Additional integration aids, function modules, libraries and add-on instructions make installation and commissioning easier and provide maximum efficiency in application and job setup.

The performance features of the AP20 combine the functionality of a high-precision multi-turn absolute value encoder with a position indicator, in a very compact form, just 48 x 88 x 61 mm. It can be installed in the machine in an area about the size of a credit card. The AP20 is therefore particularly suitable for assisting size changeovers on machines that are operated in limited space.

All Siko position indicators feature a hollow shaft, which facilitates assembly. The hollow shaft of the AP20, made of stainless steel, is standardly 20 mm in diameter and hollow shaft diameters up to 25.4 mm are available, without changing the compact dimensions of the product.

For more information contact Instrotech. Tel: +27 (0)10 595 1831 or email: sales@instrotech.co.za

The Siko AP20 position indicator which detects spindle positioning on machines, supports accurate manual adjustments during product and size changeovers.

Workplace training programme for engineering students

Leading enterprise asset management engineering company Pragma will host its award-winning Student Training Programme (STP) again in mid 2020 at its head office in Cape Town. Students are invited to apply for one of the ten sought-after places on this programme. Applications open from 1 March to 31 March 2020.

Stéphan Pieterse, Chief People Officer at Pragma, says, "The three-week programme is specifically aimed at B.Eng. or B.Sc.Eng. (Industrial, Mechanical, Electrical, Electrical and Computer or Mechatronic) students in their third or fourth year of studies. The programme content introduces students to the concepts of enterprise asset management and to Pragma's services. The students also have the opportunity to participate in coaching and mentoring sessions with Pragma's senior management team, which offers them valuable life and career lessons."

According to Darius Booyens, Associate Consultant at Pragma, the theme this year will be Data science|Future-proof your career. Booyens adds, "Data Science is a regular topic in Pragma. It goes hand in hand with connected tech – another big drive in the company. I believe that data science will go from being a wanted skill to a necessary skill in the near future, especially considering the incredibly fast expansion and use of technology in the physical asset management space. The era of connected devices and big data is here and if we aren't ready, we'll be left behind.

"The ability to solve complex problems is the top skill needed in jobs going into 2020 and beyond and, if we look at the pace at which new jobs are created and traditional ones come to an end, it's extremely important to future proof your career. Data science and machine learning will help us become better at our jobs so we can be more efficient and keep up with market demands."

Nina Booysen, Project Engineer at Pragma, says the student training programme typically runs over fifteen working days and is scheduled for 22 June to 10 July. "This year we celebrate a decade of the STP, and that coincides with Pragma's 30th birthday. We aim to reunite our Pragma STP alumni for this occasion. 2020 is a big year for the STP and will highlight the impact the programme has had on the lives of the alumni."

Pieterse explains that Pragma has a thorough and intensive student selection process. "We look at practical skills and knowledge, soft skills (presentation skills), and personality tests. Considering all these criteria, we filter through hundreds of applications and identify talented individuals from different universities. Many of the selected students end up working for Pragma and become great assets and team mates at the company. Both Darius and Nina participated in the programme."

He also points out that Pragma only considers university students for the STP. The company does have other opportunities available for non-university students and these are detailed on its website.

Pieterse has been involved in the design and execution of the student training programme since Pragma presented its first one in 2011 and he views this as a privilege and an honour. "I've seen tremendous growth in the individuals we worked with and I know that many of them are making a lasting impact at the companies they work for. We've also experienced that impact at Pragma. It's time for me to hand over the reins and who better to take over than two STP alumni! I wish Darius Booyens and Nina Booysen all the best. They will take the programme to even greater heights!"

Launched in 2011, the Pragma STP has proven successful – for participating students and for the company – and has won various industry accolades. It was recognised as the best training programme in various categories at the 2015 Skills Development Summit and again at the 2019 Skills Development Summit. It was also listed as a finalist in the Best Graduate Development Programme at the 2019 Future of HR Summit.

Interested students are urged to apply when the application window opens, from 1 March 2020.

For more information visit: https://www.pragmaworld.net/culture-careers/student-training-programme

Graduation day for students in the 2019 Pragma training programme. They are pictured here with a few of the Pragma staff involved.

Using vehicle fuel cells for power generation

Rolls-Royce and Lab1886, an innovation lab within the Mercedes-Benz group, have signed a cooperation agreement which sees the launch of a pilot project to investigate the use of vehicle fuel cells for stationary power generation. Over the coming months the Rolls-Royce Power Systems business unit, which produces solutions under the MTU brand name, will develop an integrated MTU solution for sustainable off-grid generation of continuous and emergency power, using vehicle fuel cells and focused on safety-critical applications such as data centres.

MTU generator sets from Rolls-Royce are already in service at numerous data centres worldwide, providing emergency power when needed to safeguard global internet traffic. To date, these generator sets have been diesel-engine based, but fuel cells could be a valid alternative.

The pilot project will include the construction of an emergency power plant for the Rolls-Royce data centre in Friedrichshafen. The plant will be based on fuel cell modules built by Mercedes-Benz Fuel Cell GmbH. Mercedes-Benz has developed expertise in hydrogen-powered electric vehicles through its work on many generations of vehicles, while Rolls-Royce has long-standing experience of fuel cell systems using other technologies.

Andreas Schell, CEO of Rolls-Royce Power Systems, said at the launch, “As a supplier of integrated solutions, the decarbonisation of our drive, propulsion and power generation systems is a key strategic aim. In pursuing it, we're open to all technologies – and fuel cells are set to become a key technology for us.”

Dr Martin Teigeler, R&D chief of Power Systems, added, “The idea behind the fuel cell is as ingenious as it is simple and we're all pretty familiar with it. But implementing it in practice can still be a challenge. Now that fuel cells have reached series maturity, they're ready for the commercial market.”

Alongside fuel cell technology, Rolls-Royce is researching the manufacture of hydrogen and other synthetic fuels using renewable energy sources – also for use in fuel cells. “Used in this combination, fuel cells promise to make an even bigger contribution to the energy turnaround,” said Teigeler. “We're delighted to work with Lab1886, because their technological mindset fits ours perfectly. We're confident that Mercedes-Benz fuel cell modules have the potential to open up new application possibilities in stationary power generation as well, and that's our market.”

Susanne Hahn, head of Lab1886 Global, said, “Our innovativeness has always been one of the main drivers of our long-term success and cross-industry exchange and collaboration have always been vital to it. We're delighted to be supporting Rolls-Royce on a pilot project that will bring us closer to a successful energy transition outside the realm of the automobile.”

Fuel cells for data centres

Today’s society would struggle to function without data centres, but they are also among the biggest consumers of energy. Fuel cells are now a feasible proposition for the carbon-neutral generation of emergency and continuous power to keep data centres up and running. Few energy technologies offer the same level of reliability and modular scalability and include all the benefits of renewable energies without dependence on the conventional energy market. Constantly fed with hydrogen, fuel cell systems can generate continuous power. Synergies can also be exploited for cooling, since the outlet temperature of the computer system coolant corresponds to the inlet temperature of the fuel cell coolant.

For more information visit: www.rrpowersystems.com

Rolls-Royce Power Systems – MTU – and Lab 1886, the innovation unit of the Mercedes-Benz group, are working together on a pilot project developing vehicle fuel cells for sustainable, off-grid (emergency) power generation.

Honeypot tests industrial control systems' vulnerabilities

Trend Micro, a global leader in cybersecurity solutions, recently reported the results of a six-month investigation in which it set up a 'honeypot', imitating a factory, to test the potential vulnerabilities of a typical industrial control system to cyberattacks. The sophisticated operational technology (OT) honeypot attracted fraud and financially motivated exploits.

The investigation revealed that unsecured industrial environments are victims primarily of common threats. The honeypot was compromised for cryptocurrency mining, targeted by two separate ransomware attacks, and used for consumer fraud.

Greg Young, Vice President of Cybersecurity for Trend Micro, said, "Too often, discussion of cyber threats to industrial control systems (ICS) has been confined to highly sophisticated, nation-state level attacks designed to sabotage key processes. While these do present a risk to Industry 4.0, our research shows that more commonplace threats are more likely. Owners of smaller factories and industrial plants should therefore not assume that criminals will leave them alone. A lack of basic protections can open the door to a relatively straightforward ransomware or crypto-jacking attack that could have serious consequences for the bottom line."

To better understand the attacks targeting ICS environments, Trend Micro Research created a realistic, industrial prototyping company. The honeypot consisted of real ICS hardware and a mix of physical hosts and virtual machines to run the factory, which included several programmable logic controllers (PLCs), human machine interfaces (HMIs), separate robotic and engineering workstations and a file server.

"Many of Africa's industrial businesses, from manufacturing to mining and engineering, are ramping up their use of IoT systems, although some are still grappling with upgrading their backend infrastructure," said Indi Siriniwasa, Vice President, Sub-Saharan Africa for Trend Micro. "By using a honeypot to detect unauthorised use of these industrial systems, paired with continued diligence and using secure computing techniques, industries can increase their security posture to be able to deflect and defend against attacks on their OT environments."

Trend Micro urges smart factory owners to minimise the number of ports they leave open and to tighten access control policies, among other cybersecurity best practices. In addition, implementing cybersecurity solutions designed for factories, like those offered by Trend Micro, can help further mitigate the risk of attack.

For more information visit: www.trendmicro.com

Trend Micro Incorporated, a global leader in cybersecurity solutions, helps to make the world safe for exchanging digital information. Its innovative solutions for consumers, businesses and governments provide layered security for data centres, cloud environments, networks and endpoints. All its products work together to share threat intelligence and provide a connected threat defence with centralised visibility and control, enabling better, faster protection. With more than 6 000 employees in over 50 countries and advanced global threat intelligence, Trend Micro helps secure the connected world.

Recycling plastic energy chains – a world first

What happens when a plastic energy chain reaches the end of its useful service life? Usually, it is disposed of and incinerated with other plastic waste. Motion plastics specialist, igus, has now introduced the igus green *chainge* recycling programme, starting in Germany and soon to be rolled out worldwide. Users can send their plastic chains – irrespective of the manufacturer – to igus for recycling. This means they can eliminate disposal costs – and they receive a voucher to buy products from igus. Customers and the environment both benefit.

Around the world the proportion of plastic waste that is recycled for new use is low – ranging between 10% and 20% in different countries and regions. Although a long-lasting plastic energy chain is not comparable with daily 'throwaway' products such as plastic packaging, the question of how to dispose of it still arises at the end of its service life. Recycling rarely occurs as the cost of separating the different materials in an energy chain and recycling them to make usable granulate is too high. In most factories, the typical procedure is to remove the energy chains from the machines and dispose of them with other plastic waste in industrial waste skips. In most cases, the plastics are then incinerated.

igus is now offering an environmentally friendly alternative in its green *chainge* recycling programme.

The aim of the programme is to recycle the plastic from energy chains and reuse it for new products. Old and out-of-use plastic energy chains received by igus will be sorted, cleaned, shredded and packed. They can then be reused by igus or other companies for the production of high-quality technical products. In return, the customer receives a voucher to the value calculated on a given rate per kilogram of plastic.

Frank Blase, CEO of igus GmbH, says, "In taking on this responsibility with its igus *chainge* recycling programme, the company is aiming to make a contribution towards reducing plastic waste and improving the recycling process. This is not something new for us. As the world's biggest manufacturer of plastic energy chains, we already recycle 99 per cent of the plastic waste occurring in production to reuse it as re-granulate. The *chainge* programme is the next important step towards sustainable business operations."

For more information visit: www.igus.eu/recycling, or contact Ian Hewat at Igus SA. Tel: +27 (0)11 312 1848, email: ihewat@igus.co.za

Schematic of the new igus chainge recycling programme which makes it easy for users of plastic energy chains to recycle used chains. Igus handles the separation, sorting and reprocessing of the component materials for reuse.

DIARY DATES

Africa Agri Tech (AAT)

18-20 February 2020
The Maslow Conference Centre, Menlyn Maine, Pretoria
The conference, workshops and expo will look at how the latest innovations and advances in agri tech can deliver greater efficiencies for farmers in 2020 and beyond and how best to harness technology to benefit agriculture in Africa.
Visit: www.africaagritech.co.za

Africa Energy Indaba

3-4 March 2020
Cape Town International Convention Centre
Catalysing investment and business opportunities – Africa Energy Indaba brings together the continent's energy leaders around an agenda that influences energy policy for Africa, backed by strategic partnerships with the World Energy Council, the South African National Energy Association and the NEPAD Planning and Coordinating Agency.
Visit: www.africaenergyindaba.com

Hannover Messe 2020

20-24 April 2020
Hannover, Germany
The world's leading industrial technology show will focus on key trends in industrial transformation: Industrie 4.0, industrial security, artificial intelligence, lightweight construction, logistics 4.0, platform economics, carbon-free production.
Visit: https://www.hannovermesse.de/home

PowerGen Africa 2020
Co-located with African Utility week

12-14 May
Cape Town International Convention Centre
African Utility Week is Africa's meeting place for the power, energy and water value chain. PowerGen Africa adds the focus on generation technologies, alongside transmission, distribution and metering, as well as new technologies including energy storage, mini and micro grids, IoT and ICT systems.
Visit: https://www.powergenafrica.com

Machine Tools Africa 2020

12-15 May 2020
Expo Centre, Nasrec, Johannesburg
High performance machine tools. Endorsed by Machine Tools Merchants' Association of South Africa (MTMA).
Visit: https://www.machinetoolsafrica.co.za

Electra Mining Africa

7-11 September 2020
Expo Centre, Nasrec, Johannesburg
A shared exhibition platform for the African mining, industrial, construction and electrical sectors.
Visit: https://www.electramining.co.za

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