The faster and simpler way to a better machine: with XTS

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All over the world product manufacturers have to offer increasingly individualised products – with machines that reduce the footprint and improve productivity at the same time. This is made possible by the XTS eXtended Transport System in combination with PC- and EtherCAT-based control technology. Its high level of design freedom allows new machine concepts for transport, handling and assembly. In the stainless steel hygienic version the XTS is ideal for use in the pharmaceutical and food industries.

- free installation position
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- freely selectable geometry
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The XTS advantage
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- flexible modular system
- individually movable movers

User benefits
- minimised footprint
- software-based format change
- improved availability
- increased output
- shortened time to market

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OUR COVER 12

SMC has been making its presence known in the South African market since 2015. Read our cover story on page 12 to find out more about the progress the company has made in building the SMC brand and introducing new products and services that are aligned with IIoT. Incoming general manager, Peter Findlay also speaks about how SMC is dealing with the challenges of today and its plans for the next five years.
The reality of augmented reality

Augmented reality (AR) in various forms has been around for a while, think Pokémon, but its application on the factory floor is only now starting to take off. At the Electra Mining Expo I had a chance to experience this on the Siemens stand, and I really thought I was going to fall off the edge of a platform. This prompted me to take a further look, and I discovered that AR is set to disrupt the manufacturing industry – the potential benefits are huge.

So what is AR? It’s a live view of a physical, real-world environment, supplemented by computer-generated sensory input like sound, video, graphics or GPS data, using a device such as a smartphone or headset goggles, to enhance the user’s real-world experience.

And how does AR differ from virtual reality (VR)? The answer is that AR enhances the real world while VR offers an escape from it. Both technologies will eventually change our lives just like smartphones have done. Here are some existing and potential applications.

Maintenance

Fluid power is a proven and trusted technology. Small improvements will still occur, but radical changes in the basics are unlikely. AR is an opportunity to take this robust technology and build on it with innovative ideas. For example in remote areas machine downtime is a costly problem. Hydraulics manufacturers are exploring AR to give maintenance technicians instant support from experts. A new AR tool from Bosch Rexroth allows field technicians to work with a service expert easily, through the use of a smartphone or a head-mounted camera and headphones, allowing them to visualise the health of the machine and remotely troubleshoot problems.

Airbus is using an AR application to give assembly workers access to complete 3D models of each aircraft under production. This has been used on the A380 and A35 production lines to check the integrity of structural brackets that hold hydraulics in place. Lift manufacturer, Thyssenkrupp is using Microsoft’s Hololens technology as a service tool. Technicians can visualise and identify problems ahead of a job, and have remote, hands-free access to expert technical information when on site.

Complex assembly

Modern manufacturing involves putting together hundreds and thousands of pieces in complex assemblies very quickly. AR allows technicians constant access to diagrams, schematics and work orders, right at the edge of their field of view, compared with glancing back and forth between the workplace and a pdf with instructions. They can visualise the part and the assembly details through 3D hologram instructions. With over 200 km worth of wiring in every new 747-8 Freighter, Boeing is combining the power of voice with AR. Using Skylight wearable technology, technicians assembling complex wiring harnesses interact with the software on smart glasses using voice commands, remaining hands-free to perform their task. With no room for error, Boeing has cut wiring production time by 25% and reduced error rates effectively to zero.

Training

You can deliver advanced training together with actual parts and assemblies, combining execution with learning. Previously Lock heed took years to assemble a finished F-35 aeroplane. Using HoloLens technology, engineers cut the time required by 30% with advanced learning, which involved representation of every step in the process; and GE Aviation leverages voice to interact with the AR app, Skylight on Glass – integrated with a WiFi-enabled torque wrench – to tighten B-nuts on jet engines, with 12% efficiency improvement.

Quality assurance

A pilot programme running at a Porsche assembly plant in Germany has technicians using AR as a tool in the quality assurance process. The idea is that quality professionals can take photos of parts or assemblies on vehicles under inspection, and then compare those images to ones provided by the company’s suppliers via an overlay.

Logistics

In warehouse organisation and order fulfilment, employees could tap into a connected system that tells them exactly where products and goods are, allowing them to work at a much faster pace. DHL is testing mobile AR systems where employees use smart glasses that greatly increase productivity and reduce errors. With exponential growth in e-commerce, the company recently announced plans to expand efforts in AR, robotics, process automation and IoT in its facilities. HoloLens2 is already out. At $3500 it’s a bit beyond me for the moment, but I note that it was designed to be connected to a smart phone via Bluetooth to provide coordinate input. As the technology becomes more affordable, it is possible that AR technology will be used in factory settings to provide real-time information to workers on the factory floor.

Kim Roberts
Driving force for the future

Association Objectives

- Raise the professional standards of the pneumatics and hydraulic industries
- Stimulate and promote education and training in the fluid power industry
- Build synergistic rapport between companies within the industry
- To promote, collect, collate, distribute data, ideas and knowledge
- To encourage the growth of the membership base

For more information visit our website www.safpa.org.za
or call +27 (0)11 888 7163

SAFPA membership certificate may be used to support tender applications, members are also welcome to use the SAFPA logo on all their advertising.
From the President’s desk

I’m back to serve another term as the SAFPA president, thank you to the council for electing me to stay on for another year, I am honoured.

Unfortunately, SAFPA will not be running the industry survey this year as some major players within the fluid power industry have elected not to participate, therefore the results of the survey would not be reliable and worth the investment. Other avenues are currently being investigated to measure the industry size and express this in a meaningful quantitative manner.

By the time you read this, the sub-committee for pressure vessels will have been formed and pushing ahead with compiling a meaningful document available to SAFPA members regarding pressure vessel legislation in South Africa. The aim is to have this report in a draft phase for peer review by the end of 2019.

SAFPA would still like to continue with the awareness of ISO standards available within the hydraulic and pneumatic industry for various product lines and system engineering. We shall endeavour to create awareness of these standards to ensure equipment manufacture and sourcing is in line with global standards and equipment is safe for operation. Upcoming technical evenings will focus on familiarising the industry with these standards.

On a personal note, I would like to thank the SAFPA council, CTR and Hydac for the generosity received by my wife and I celebrating the birth of our first child, Tristan Pereira born 29/05/2019.

Regards
Dustin Pereira

SAFPA AGM 2019

At the recent SAFPA AGM held at Jeppe Quandam Bowls club the keynote speaker was Russel Schwulst from Festo. He gave a presentation comparing pneumatic and electric automation on municipal water and wastewater plants.

The SAFPA president is Dustin Pereira (Hydac) and the vice president is Wessie van der Westhuizen (Pirtek). The other committee members are Willem Gijzelaar (Bosh Rexroth), Russell Gill (Engineering & Hydraulic Services), Eugene Tondolo (Axiom Hydraulics), Michael Abbot (CT Hydraulics), Ryno Landman (BMG) and Manny Vieira (SMC Corporation) and Hannes Otto (Festo).

From l: Hannes Otto, Festo; Manny Vieira, SMC Corporation; Michael Abbot, CT Hydraulics; Willem Gijzelaar, Bosch Rexroth; Ryno Landman, BMG.

SAFPA UPCOMING EVENTS

SAFPA Cycle Race
Friday 23rd August 2019
at Avianto

SAFPA Golf Day
Thursday 5th September 2019
at Modderfontein Golf Club

SAFPA Soccer six-a-side
Sunday 10th November 2019
in Benoni

Join us on one or more of the upcoming events and network with your industry whilst having some fun.

Contact Angie to find out more.
Tel: +27 11 888 7163, ctr@safpa.org.za or www.safpa.org.za

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**South Africa wins international student cluster competition**

A team of six South African undergraduate students recently took first prize against 13 teams at the International Supercomputing Conference (ISC) in Germany. This spectacular success followed four days of working on a selection of tests and applications to optimise and run their computer cluster to demonstrate the performance of their chosen design.

The team of four UCT students and two Wits students entered the rigorous and fiercely contested competition following their success at the national round, where they beat nine other South African teams. The team took on 102 members of teams from all over the world. The team took first place with the highest overall score for all the benchmarks they were given. Team South Africa has won the competition four times.

The selection phase coincides with the Centre for High Performance Computing (CHPC) Winter School. This is designed to impart critical knowledge for building a cluster, which includes using Linux systems, the basic software stack of a cluster and considerations when choosing hardware. Selection concludes with an assignment that requires each team to build a prototype cluster in the cloud. The teams selected proceed to the national competition. Here participants build small high performance clusters out of hardware provided by the CHPC and its industrial partners. They are given a selection of applications to optimise and run on their cluster to demonstrate the performance of their design. The teams are judged on a combination of the performance of the applications and the design of the cluster.

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**SKF’s Meet The World initiative**

Gothia Cup is the world’s largest youth football tournament. Each year, around 17 000 teams from 80 nations travel to Gothenburg to take part and play 4 500 games on 110 fields. With its headquarters in Gothenburg, SKF has been involved in Gothia Cup since 2006. Its Meet The World initiative is the company’s largest company-wide social responsibility project and involves local SKF offices and employees arranging local qualification tournaments in their respective countries. The winning teams get to travel to Gothenburg and participate in the world’s largest youth football tournament – a memory for a lifetime. SKF Meet The World has given more than 4 750 children from 46 nations the opportunity to travel to Gothenburg.

This year, around 420 children from 23 countries will participate in Gothia Cup as part of the SKF Meet The World initiative.

SKF president and CEO, Alrik Danielson says: “Gothia Cup is a fantastic meeting place for the world’s youth, irrespective of religion, skin colour or nationality, with football as the common denominator. At the opportunity to travel to Gothenburg.

**Bosch Rexroth hosts customers at the Bosch Rexroth HUBB**

The Bosch Rexroth South Africa Group of Companies recently held its first customer day at the Rexroth HUBB in Kempton Park. In a celebration of the Group’s relationships with its customers and business partners, customers were treated to a tour around the 16 000 m² facility, showcasing the numerous modern engineering and production facilities.

Working demonstrations of the various technologies and systems offered by the Group, in addition to a large collection of products and components from across the 30+ international brands it represents in Africa, were on show in the assembly areas. Facilities such as the Group’s hydraulics and pneumatics test rigs and training rooms, and solutions such as Hytec Services Africa’s containerised mobile hose workshops for mines were also open to customers.

“Bosch Rexroth South Africa is an integral part of the entire Rexroth Group,” said Group executive president and chief financial officer, Dr Markus Forschner. “Our commitment to quality, innovation and customer focus is clearly demonstrated today. The building, the production environment, but most importantly everyone in this organisation, reflects our motto: We Move, You Win.”

Over 250 of the Group’s valued customers attended, and were joined by regional president for Africa and Group CEO, Tillmann Olsen, Forschner, as well as general managers and staff from the Group. Customers were able to discuss their application challenges with the Group’s specialists across its hydraulics, pneumatics, assembly, linear motion and automation offerings to identify potential avenues of performance and process optimisation.

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This year’s highly successful Engineering Community Conference hosted by technology specialist, ESTEQ at the CSIR International Conference Centre focused on how to future-proof your businesses, ideas, products and jobs. The event provided engineering professionals from a wide range of industries the opportunity to share their experience and ideas on the use of technology to develop better products and systems. Gold partners were Siemens, Standard Bank and Syspro, while silver partners were Aerotherm, Additive Manufacturing Solutions (AMS), Autoform and ASIC.

Delegates were held spellbound by keynote speaker Dion Chang, CEO of FluxTrends, who talked about the second wave of disruption. Citing four megatrends – robotics and automation, big data, cloud computing and mixed reality – he described different types of pivot that are already impacting business, and outlined the skills and mindset required for companies to leapfrog into the future.

This was followed by talks on digitalisation in South Africa and how to contextualise it in an African context by Edwin Severjijn, senior vice president and managing director EMA of Siemens Industry Software; Cobus Oosthuizen, CEO OF ESTEQ; and Ralf Leinen, senior vice president of Digital Industries, Southern and Eastern Africa.

In the subsequent breakaway sessions, papers were presented by engineers from a variety of industries and technology applications covering specialised user-focused topics in the areas of digital enterprise, engineering simulation, product design and PLM, manufacturing solutions and test and measurement.

The highlight was the announcement of the acquisition of ESTEQ by Siemens and the signing of the agreement in front of the conference.

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There is a serious shortage of women in engineering. Globally it is a male dominated field. According to ECSA, only 11% of the total number of engineers registered are female and only 4% of these are professional engineers. AVK production foreman, Portia Magongoma is making a difference and inspiring other women to pursue careers in engineering.

Magongoma has a Bachelor of Technology degree in Mechanical Engineering and recently graduated with a BA in Business Administration. She also has a National Diploma in Mechanical Engineering, a Certificate in Operations Management, and is a trained forklift operator. A registered member of ECSA, this mother of two says: “It is possible to have both a successful career and a family.”

As a newly qualified engineer, Magongoma’s first job was on-site at a platinum mine. “I was young, female, on my first job, having to give instructions to older, experienced men on a mine,” she says. She recalls how language was the biggest barrier. They spoke Tswana and Afrikaans while she spoke Zulu and English. “I was giving instructions and discussing safety protocols – the message had to be perfectly clear.” So she learned the languages.

When Magongoma moved to AVK Valves she was far more experienced and had gained confidence. “AVK Valves has been incredibly supportive of me and my vision,” she says. AVK Valves funded her Business Administration degree and she’s looking forward to giving back to the company through her new knowledge and expertise and inspiring other women to follow their dreams. “Some people think women can’t do this and can’t do that,” she says. “AVK Valves and Gunric never had those stereotypes. Women can do anything.”

As the first one in her family to graduate from university, Magongoma is incredibly proud to be where she is. “I will teach my children that anything is possible if you are committed. Yes, there are challenges, but the key to success is to know what you want and focus on the goal rather than the obstacles.”

Magongoma’s vision doesn’t end there. She was drawn to engineering because of its diversity. “I want to be an expert in valves – every aspect from design to production to quality assurance. I love working with my hands and really enjoyed my time on the shop floor.” Now she has her sights set on bigger things. “I have combined engineering with business administration and management because I want to know everything there is to know about valves and the business of valves – from the engineering to HR, to labour law and finances – all of it. The only thing that convinces people that they can reach their impossible goals is to see a role model actually doing it.”

Magongoma has high hopes for the future. With her energy, passion and dedication, she is set to be a pioneer in the engineering industry.

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The spherical roller bearing (SRB), that helps engineers accommodate heavy radial and axial loads in applications prone to misalignment or shaft deflections, celebrates its 100th birthday this year thanks to SKF. Originally developed in 1919 by an SKF engineer, Arvid Palmgren, the SRB has since made its mark worldwide. The initial SKF design has now become part of the largest family of products in the industry. SKF SRBs can be found in many applications, including some where you might not expect them. On the fabled Las Vegas Strip in the US, the High Roller ferris wheel contains two of the largest SRBs ever produced by SKF, each weighing in at 8,8 tons. Another example is the Bahrain World Trade Centre, where three tower wind turbines generate 1300 MWh per year. The main shafts of the turbines are equipped with SKF spherical roller bearings. Another alluring application is the rebirth of the Zeppelin after 60 years of absence following the Hindenburg disaster. SKF was brought in by the gearbox manufacturer for the Zeppelin NT, to help the new and improved airships to propel forward.

SKF’s extensive SRB range delivers a range of benefits for specific operating conditions delivering cost-effective, optimised rating life and minimal maintenance in the harshest of environments.

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For more information contact Sayuri Naidoo, AVK Southern Africa, +27 11 908 3760, sayuri@avkvalves.co.za, www.avkvalves.com
A Digital Enterprise journey

Siemens recently demonstrated its Digital Enterprise portfolio at the Africa Automation Fair (AAF), showcasing its current and future digital automation technologies. Motion Control’s editor met with Ralf Leinen, senior vice president for Digital Industries, Southern and Eastern Africa, to find out more.

Motion Control: How is Siemens Digital Industries aligning itself with the Fourth Industrial Revolution?

Leinen: The core of what we do is what we call Business to Society. When we do business, it matters to us that we leave something behind. Making the sale is not the driver, we want to do the right things – like increasing employment and upskilling people. So besides reaching our business targets, we want to extend our reach into the market and do what matters. We want to drive our social responsibility in a very humble way. This one thread goes through Siemens globally. We believe that companies can only truly succeed if they help to fulfill the needs of the society, they operate in. Besides helping to drive a country’s economic growth, businesses should add lasting value to communities.

On the other side, Siemens has taken on the responsibility of continuously driving innovation in the field of automation and digitalisation and is the undisputed leader. Technology trends develop from innovation and we distil these into products, solutions and services. That’s what we want to demonstrate at AAF.

We can go back in history to see the progression. When I came to Siemens 30 years ago, we automated machinery and that was a quantum leap. Then we automated whole production lines and that was considered a quantum leap at the next level. Then whole factory floors were interconnected. Now we come to the next level: how do we further strive for productivity and speed-to-market flexibility? Our drivers are speed, quality, flexibility and safety. Here in South Africa specifically it is about how to increase safety. These things cannot be achieved by putting in another level of automation, it is about how to make technology meaningful.

Through the integration of cutting-edge technologies into our portfolio, we can help industrial companies to benefit from rapidly growing data volumes in new, wide-ranging ways. With the use of technologies such as artificial intelligence, edge computing and additive manufacturing, we are paving the way for the future of industry. With artificial intelligence, we have self-learning, self-communicating, self-diagnostic machinery; and edge computing turns the mass of data generated into meaningful information. To handle this mass of data you put computing power at the edge of the machinery. The task is done there and only the relevant data that has been processed at the edge is taken up to a higher level. You only extract what belongs in the boardroom or at the plant manager’s dashboard. This is a far more effective way of handling data; and without this data, you are not able to make effective decisions or increase your go-to-market. So, we say it makes sense to use artificial intelligence in machinery and edge computing in larger environments. Edge computing technology is the missing link and it is putting processing power close to the action.

When we talk about skills development, people and services, virtual reality and augmented reality are the technologies that provide our people with ways to upskill, support and operate. These are the things that we talk to our customers about when we discuss their roadmap for the next three to four years.

The old way of doing things is over. The force and speed with which the use of data increases is huge. Now people go into the virtual world with a digital twin before they start building a plant. This represents an idea and how to execute it and creates huge potential for even higher productivity. You create a virtual twin of your product, production, performance and service and take the data and feed it back in an ever-recurring cycle of optimisation. This is what people are asking about – they need to squeeze out all the elements of productivity.

This is what we mean when we talk about digitalisation. It is the realistic coverage of the value chain of our clients. The value chain goes from what to build, to how to do it, to how to keep operations going. Siemens technology allows us to drive this.

In the last ten years Siemens has invested €11 billion in additions to our portfolio by acquiring companies, software and elements of products to drive this holistic approach from automation to digitalisation. We continuously innovate. The future will be artificial intelligence, edge computing, neural networks, digitalisation and IIoT.

The understanding of this technology has evolved, and all the links are falling into place. Automation will remain a fundamental layer of what we discuss, it’s the basis; but it all comes down to the real context.
Sometimes it's just a dashboard in the boardroom. Sometimes the simplest things make the biggest difference.

Siemens Solution partner, New Africa Control (NAC) joined Siemens at this year’s AAF. A chat with NAC’s MD, Alan Taylor provided an example of the Siemens philosophy in practice.

**Motion Control:** What is your business?

**Taylor:** We buy equipment from Siemens and sell it on as part of a solution. We specialise in factory automation and our main customers are the mines. We have some of the most recognised specialists in the industry because of our Siemens connection. Siemens has opened its software suite so we have access to the kernel software and can develop applications within the Siemens environment.

**Motion Control:** How is IIoT playing out in the mining industry?

**Taylor:** We have been involved in digitalisation for quite a while, getting information to the customer. On the ground we take measurements and send that data to industrial computers. From there we bring it to the operational level, where operators sit in front of hundreds of screens. We also get into sequential starts and stops, where large parts of a plant start up automatically. Then we provide predictive maintenance and are well known in the industry for diagnostics. We can quickly diagnose problems and pass on a huge amount of information about an object. This could be a temperature measurement or a motor running – there are thousands of pieces of information. A report is issued and then the operator knows where to go and what to do. The end-user is always aware of what is happening.

One of the big mines we work with is based overseas, so the information is moved wherever it’s needed within the hour, so people at investment tables on the other side of the world know what is going on. For example, they can see the downtime, or what water has been used, or what the production volume is. They have all the information at their fingertips.

Then the last thing is that digitalisation is moving to handheld devices and this is fully operational. When there is a fault, depending on the level it gets passed through general information and is captured in a report; otherwise a problem that cannot wait is flagged by sms. This is a huge part of our business. We can make the right person aware at the right time.

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“The old way of doing things is over. The force and speed with which the use of data increases is huge. Now people go into the virtual world with a digital twin before they start building a plant. This represents an idea and how to execute it …”
Schneider Electric has once again gained recognition for its efforts in sustainable development, being awarded both first and second place at the annual Steel and Engineering Industry Federation of South Africa (SEIFSA) Awards for Excellence for Best Corporate Social Investment. In addition, on the same evening, the company won the Best Business Collaboration France-South Africa at the French South African Chamber of Commerce and Industry (FSACCI) Annual Gala Awards. “At the core of our sustainable development strategy we have had an in-depth focus on providing access to energy and access to education,” said Zanelle Dalglish, head of Sustainable Development and Academy for Anglophone Africa.

The Isiboniso project based at Isiboniso Primary School, situated in the impoverished community of Orange Farm has addressed numerous challenges and through strategic partnerships, Schneider Electric has implemented sustainable solutions. Thus far, the company has provided two container classrooms for the young learners and in collaboration with UJ supplied off-grid electrification through solar solutions, to power the use of computers, printing copiers and lighting in the classrooms. In addition, safe electricity workshops were run to educate learners on the suitable and safe use of electricity, with electrical plug points installed for the first time in all the classrooms.

Its second SEIFSA Awards entry, French South African Schneider Electric Education Centre (F’SASEC), received the second placed Best Corporate Social Investment Award. The F’SASEC network accelerates practical training for potential artisans in the field of energy and consists of the Vaal University of Technology, Sedibeng TVET College, University of Johannesburg, College of Cape Town, Cape Peninsula University of Technology and Don Bosco Mozambique. The F’SASEC network introduces advanced teaching methods and training that is in line with the Department of Higher Education and Training’s vision of accelerating artisans using state of the art equipment, focusing on preparing young South Africans from previously disadvantaged social backgrounds for the job market, with a particular focus on women.

Schneider Electric was recognised as the company that has best displayed a positive social/educational/governmental interaction between the communities of France and South Africa.

“It was a wonderful night for us. The awards serve as a validation of the power of partnerships and our core belief that access to energy and education enable sustainable impact,” concluded Dalglish.

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### Appointments

- **BMG** has appointed Robin Briggs as managing director.
- **Bearings International** has appointed Kathy Shepherd as business development leader – wholesale and retail.
- **Bearings International** has appointed Rudi Rudolph as segment leader – manufacturing.
- **Bearings International** has appointed Sharon Van Niekerk as business development leader.
- **Hytect South Africa** has appointed Kobus Badenhorst as systems sales manager.
- **Hytect South Africa** has appointed Colin Simms as regional manager, Central Region.
- **Hytect Zambia** has appointed Donald Kanjungu as general manager.
LIGHTER, MORE FLEXIBLE AND EASIER-TO-HANDLE

Introducing MXT™, Gates’ innovative hydraulics solution designed specifically to address evolving application challenges: lower equipment weight, easier hose assembly and less assembly time. Made with high-performance reinforcement and a robust, abrasion-resistant rubber cover, MXT™ is a universally applicable premium product offering performance exceeding industry standards. It meets the needs of diversified applications, which allows you to consolidate inventory while giving you exactly the hose you need, when you need it.

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3X LIFETIME
UP TO 40% DECREASED FORCE-TO-BEND
UP TO 30% LIGHTER

DRIVEN BY POSSIBILITY™
SMC is here to stay

SMC has been making its presence known in the South African market since 2015. *Motion Control’s* editor paid a visit to incoming general manager, Peter Findlay, to find out more about the company’s progress.

Motion control: How does SMC SA fit into SMC’s global vision and strategy? Findlay: SMC entered the South African market directly in 2015 as a subsidiary of SMC UK, and in turn as a subsidiary of SMC Corporation Japan, a Fortune Global 500 company. Globally, SMC Corporation has always built impressive and long-standing relationships with Original Equipment Manufacturers (OEMs), whether they be in the automotive, food, beverage and packaging equipment, resources and mining, manufacturing or even in more specialised semiconductor industries.

South Africa has an incredibly strong and deeply localised automotive industry, with all the OEMs and their multi-tier suppliers present. This industry contributes massively to our GDP and is also fully integrated into global supply chains and manufacturing planning. This drove SMC Corporation’s decision to establish a full subsidiary in South Africa, working closely with strategic local distribution partners, to support global projects, planning and specification of SMC products right here in South Africa. Many key sourcing decisions are being made here and we contribute both insight and support to those decision.

We’ve had tremendous technical training and system support from both SMC UK and Japan in setting up systems, supply chains and our local operation. A planned hand-over process is ongoing as we transition into a self-sufficient entity with our South African customer relationships as primary focus. Our MD, Kevin O’Carroll remains based in the UK providing us with extensive experience and resource efficiency, but our operational perspective is all here in South Africa. I come from the automotive Tier 1 manufacturing industry with Toyota, VWSA and Ford South Africa as OEM customers. My goal is to translate and expand that experience into our sales and support teams at automotive customers, but further also into South Africa’s extensive food and packaging and resource processing industries.

We have shown remarkably strong sales growth since 2015 and are now focused on customer and product consolidation within South Africa. This involves understanding the market and ensuring our resources are best placed to serve our demanding customers, both from a leadtime and technical consultation perspective. We are now largely operationally self-sufficient but will always serve an important ambassadorial and representative role for SMC within South Africa.

Southern Africa is booming, with massive investments and here too we plan to use well established South African insight to boost SMC’s global support and servicing of OEM lines and equipment within Africa. These may be manufactured anywhere in the world, built with SMC products already integrated by those line builders. It is our duty and pleasure to support SMC’s global agreements and product supply.

What are your key target markets? Findlay: The automotive industry is always going to be key within the South African context, despite being in a manufacturing slump. A big positive in the motor industry is the clarity now available regarding Government’s automotive incentive programme, the SA Automotive Masterplan. This plan drives local content and sourcing down the supply chain. This has created a renewed confidence in the industry, which we’re already seeing translate into quotations and new investments. SMC has also established multiple global supply agreements in the food, beverage and packaging industries and these serve us well in servicing end users and line builders across southern Africa.

I am always fascinated by the level of innovation and expertise I see in our own home-grown design and manufacturing
customer base. These are truly world-class products requiring only the best SMC world-class pneumatic, electric and motion control products.

Are you launching any special products or initiatives this year?
Findlay: We offer truly innovative product lines to mitigate static build-up in applications where friction is problematic. These products provide clear, measurable results that directly improve handling and processing efficiency, with excellent success at our customers.

Most of our new product focus is on reduced size – a smaller efficient installation footprint – and energy efficiency, through lower product pressure requirements and air usage, facilitating lower main line supply pressures in factories.

An ongoing focus is air preparation, where we are educating the local market around the importance of clean, dry air. We offer specialised driers and air preparation products that offer clear maintenance and reliability benefits.

In line with the global trend towards electrical alternatives, to complement our pneumatic solutions we offer a full range of high-tech IO-Link, Ethernet-IP, Ethercat and Profinet controllers and an extensive range of actuators to suit.

Locally, SMC South Africa manufactures specialised and custom cylinders and positioners and control valve bank assemblies. We also design and manufacture complete turnkey control panels to suit customer specifics. There is great added value for customers in these products when quick, easy commissioning is required. We believe strongly in local manufacturing as it enhances our own technical competency.

A huge positive we offer is price stability, having kept pricing consistent over the last four years, despite our fluctuating exchange rate. SMC has a fully integrated global stock management system, with innovative inventory and price management. This gives us access to uniform pricing worldwide and an efficient way of quoting within a global project perspective. We can translate that globally into southern Africa.

Our customers and the economy may be running lean at the moment, but our South African survival spirit cannot be stifled for too long. We see only success ahead for SMC Corporation South Africa.

What have the challenges been and how have you dealt with them?
Findlay: In the South African context, our challenges are poor economic growth and the resultant lack of purchasing and investment confidence. Our approach is therefore increased understanding of our market and supporting the key decisions our customers are making.

What have your achievements been?
Findlay: Our achievements include galvanising the SMC brand and showing South Africa who SMC is globally. This has grown our sales dramatically and now we are truly the face of SMC in South Africa. In several cases, we have taken SMC from a completely unknown name to a supplier of specified products, directly to our key customers, who are supplying into the global arena. Consolidating relationships is ongoing. We are in the country to stay and our plans for southern Africa are clear.

Going forward what are your plans for the next five years?
Findlay: Market share and technical excellence are key. We have an excellent grasp of the market and have built up strong relationships.

Our goal is to continually enhance our already impressive technical capability, as this is what differentiates us in the market. We will continue the development of our sales engineers and are working continuously on operational efficiencies. I hope to use the skills, systems and efficiencies of the automotive industry and translate SMC’s global excellence into southern Africa.

Our customers and the economy may be running lean at the moment, but our South African survival spirit cannot be stifled for too long. We see only success ahead for SMC Corporation South Africa.

For more information contact SMC Corporation South Africa, +27 10 900 1233, zasales@smcza.co.za, www.smcza.co.za

Peter Findlay, general manager, SMC Corporation South Africa.
Does edge computing have the edge?
Implementing artificial intelligence in industrial manufacturing.

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

**Artificial intelligence and the cloud vs the edge**

Two technological advances that are playing a vital role in the improvement of machines are cloud computing and edge computing.

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

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

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

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

However, although AI offers great potential benefits, care needs to be exercised before incorporating it into industrial applications. All too often, companies are eager to start implementing and using AI without being fully aware of the challenges they could face. So, what are the key issues involved in deploying AI and in determining how AI can improve a production line or a process, and if cloud computing or edge computing should be implemented?
want to analyse the performance of a machine that isn't meeting your full specifications. This can be difficult in a mass production scenario. For example, a manufacturer who is providing parts for the automotive industry might need to generate 100 000 items per day, that need to be delivered ‘just in time’ to the customer so that they can be built into cars the next day. If it takes two weeks to analyse the quality data to discover that the product isn't meeting the specifications, this could delay the identification of an issue that could then lead to an extensive product recall.

This is therefore a completely different problem that needs solving. It can't be solved in the cloud as it can take hours or days to collect the data there and analyse it. Instead, you need a solution that will run in your machine that can identify a low quality pattern before the 100 000 items are even shipped, or before they are even produced to avoid scrap. This is where edge computing is very useful.

The main challenge remains: what problem do you want to solve? A company with strong, top level management should know the key challenges that it faces and will want to use the most effective tools that will optimise its performance. The problems you face will determine what you need to do. For instance, do you need to look wide, at a lot of data? If you want to compare a large amount of data from 20 factories, this is where AI in the cloud can play a key role. If you need an immediate reaction on a bottling line for example to avoid downtime, you should consider a solution with AI at the edge.

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

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

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

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

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

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

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

In this way, AI can contribute to direct and immediate results because the intelligence is incorporated within the machine rather than being located elsewhere. Users can focus on potential issues in the process using the real-time data from the system and its components.

Omron’s AI Controller has some pre-programmed tools that can help with simple cases of preventative maintenance. Using advanced mathematics, it can detect a problem or a deterioration in part of the equipment before a machine breaks down. However, with more complicated machines and with problems which involve more detailed use of AI, currently you will need specialists with advanced skills, such as data scientists and software engineers, if you want to extract the maximum value from this new technology.

**Issue 3: How secure is your data?**

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

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

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

**Conclusions**

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

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

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

For more information contact Omron Electronics, +27 11 579 2600, info.sa@ieu.omron.com, www.industrial.omron.co.za
A new smart sensing solution from ABB can reduce downtimes of low voltage motors by up to 70 percent and extend their lifetime by up to 30 percent.

Until now, the monitoring and preventive maintenance of low voltage motors has been time consuming and expensive. New technology from ABB transforms simple motors into intelligent machines that tell you when they need servicing. Smart sensors attached directly to the motor supply information regarding operating and condition parameters via wireless transmission.

The innovative sensor technology offers plant operators not only huge potential savings on maintenance and repair, but will henceforth also make it easy to utilise the Internet of Things, Services and People (IoTSP) for millions of motors. The IoTSP is ABB’s concept for enabling its customers to take advantage of the opportunities of digitalisation. With the new solution, small and mid-sized companies can also benefit from the advantages offered by the IoTSP.

The smart sensor provides information on operating and condition parameters such as vibration, temperature or over-load and calculates power consumption. The data are analysed by a specially developed software program and provided to the plant operator in the form of graphics for maintenance planning, thereby enabling downtime reductions of up to 70 percent. At the same time, the lifetime of the motors can be extended by up to 30 percent and energy consumption reduced by as much as 10 percent, so that the investment in this innovative form of condition monitoring pays for itself in less than a year.

“Optimised maintenance schedules help reduce maintenance costs greatly. Unscheduled outages are reduced considerably or even eliminated completely. Increased availability significantly boosts our customers’ productivity.”

“This innovative solution makes condition monitoring the new standard for low voltage motors,” says Pekka Tiitinen, president of ABB’s Discrete Automation and Motion division. “Optimised maintenance schedules help reduce maintenance costs greatly. Unscheduled outages are reduced considerably or even eliminated completely. Increased availability significantly boosts our customers’ productivity.”

This innovative solution is not restricted to new motors made by ABB. The sensors can be installed at the factory or retrofitted on already operating low voltage motors within minutes. “The sensors will also be available in the Middle East and can be used on any low voltage motor, in any industry, from food and beverage to steel and chemical plants,” adds Gus Abboud, lead division manager, Discrete Automation and Motion, Middle East and Africa.

Cybersecurity is guaranteed at all times with the new sensor technology from ABB. The sensor is not electrically connected to the motor, so unauthorised parties cannot access the motor via this route. The smart sensors wirelessly transmit the data via encryption protocols to a secure server where they are analysed using special algorithms. The cloud-based server implementation fulfils all of ABB’s strict specifications for cybersecurity. The data are stored in the cloud in encrypted form. The Internet-based customer portal also uses a role-based access protocol to make the data securely accessible.

For more information contact Thinus Jacobs, ABB, +27 11 504 4000, thinus.jacobs@za.abb.com, www.abb.com
Siemens SINAMICS Converter Family

With the SINAMICS converter family, you can solve any individual drive task in the low-voltage, medium-voltage and DC voltage range. From Siemens converters to motors and controllers, all drive components are perfectly matched to each other and can be easily integrated into your existing automation system.

With SINAMICS converter you are prepared for digitalization. You benefit from highly efficient engineering with a variety of tools for the entire product development and production process. And you also save space in the control cabinet – thanks to integrated safety technology.

SINAMICS - simply my drive!

www.siemens.com/sinamics
Rockwell Automation has expanded the power ranges and capabilities of TotalFORCE technology for its Allen-Bradley PowerFlex 755T AC drives. The drives now offer an expanded power range, helping engineers with applications from 7.5 to 4500 kW improve productivity and reduce their lifecycle costs. The expansion brings harmonic mitigation, regeneration and common bus-system configurations to a wider range of high demand applications.

Enhancements to the patented TotalFORCE technology include more powerful adaptive control capabilities, which allow the drives to monitor machine characteristics that can change over time and automatically compensate for the changes that occur. An adaptive tuning feature uses up to four automatic tracking notch filters to block resonance and vibration that can impact quality, waste energy and prematurely wear out a machine.

In addition, predictive maintenance features provide real-time information about the health of the drive. By monitoring operational characteristics such as temperature, voltage and current, the drive is able to calculate the remaining life of critical components and notify users. This allows users to act so unplanned downtime can be prevented.

“TotalFORCE technology enables PowerFlex 755T drive users to take a proactive approach in improving machine uptime. The drives can deliver information about the status of an application to the control system, which can be critical for reducing downtime and increasing productivity,” said Adrian van Wyk, Power and Components, Rockwell Automation sub-Saharan Africa. “The drives’ ability to be self-aware also enhances reliability and simplifies service.”

The PowerFlex 755T variable frequency drives were previously designed for 120 to 2250 kW power applications. The expanded power range makes PowerFlex drives ideally suited for large power applications, such as pumps and fans requiring harmonic mitigation, and regenerative applications requiring anti-sway functionality, such as cranes and hoists. The offering includes:

- **PowerFlex 755TL drive:** The PowerFlex 755TL drive uses active front-end technology and an internal harmonic filter to reduce harmonic distortion. The drive is now available from 7.5 to 1400 kW.
- **PowerFlex 755TR drive:** Delivering power from 7.5 to 4500 kW, the PowerFlex 755TR drive includes both regenerative and harmonic mitigation solutions. The drive helps reduce energy consumption and costs by delivering energy back to the incoming supply, resulting in a more energy-efficient solution.
- **PowerFlex 755TM drive system:** This allows users to build the system that best fits their needs for regeneration and coordination of multiple motors in common bus configurations. To optimise their system requirements and meet power consumption needs, users can select from a series of predesigned modules with a power range from 160 to 4500 kW for motor side inverters and a range of 70 to 4800 kW for regenerative bus supplies.

Other new capabilities include an integrated safety module that delivers several advanced safety functions on an EtherNet/IP network, an anti-sway feature that helps lifting applications achieve greater stability and permanent magnet motor control for increased energy savings.

Combined, these new TotalFORCE technology capabilities help reduce time to commission, optimise performance and enable simplified maintenance and serviceability throughout the full lifecycle of PowerFlex 755T drives for a broad range of applications.

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Automated post-print processing on 3D printed parts

Additive manufacturing processes can produce parts with the most complex geometries in a single operation. However, post-processing these 3D printed parts is time consuming and costly. In order to remove this bottleneck in the production process, PostProcess Technologies has developed a series of machines that leverage a groundbreaking chemistry of detergents and abrasive media. The newest example is the Hybrid DECI Duo. The multi-functional machine provides automated removal of support material and surface finishing. It was automated with control technology from Beckhoff.

The challenges of post-print processing in additive manufacturing include surface finishing and the removal of support material. Particularly when building complex structures, any overhangs or other asymmetrical contours require the use of support materials. These ensure that the workpiece does not collapse during production and maintain the correct shape of the part during printing. The support materials must be removed afterward. In addition, the parts printed from materials such as advanced thermoplastics, light-cured resins and metals often require finishing to achieve the desired look and feel while meeting requirements for size, texture and precision.

PostProcess Technologies was founded in 2013 with a vision to revolutionise additive manufacturing by removing the post-print bottleneck, thus paving the way for economical series production. The company developed a completely new process that leverages a groundbreaking chemistry of detergents and abrasives as well as pressure and temperature instead of using cutting tools.

The core of the PostProcess solution is the proprietary Automat3D software, which, guided by the company’s Agitation Algorithms (AGA), facilitates different agitation or intensity levels in post-print processing. By individually adapting the process parameters, the solution can meet the requirements of even the most varied part geometries without destroying important structures.

As PostProcess began to implement its machines, the company knew it needed proven, robust automation components. Since most of the 3D printers are not PLC driven, but rather PC driven, they decided to use PC-based control technology from Beckhoff. PostProcess has developed a range of different machines for removing support materials or surface finishing. The newest addition to their product offering is the Hybrid DECI Duo, the first multi-functioning machine that combines both processes in a single compact system that helps optimise valuable production floor space.

“A PC-based platform that combines Windows OS and automation tools based in Visual Studio was an ideal fit for our programming efforts, given that we are not specifically controls engineers, but lean more toward computer science;” says PostProcess president and CTO, Daniel Hutchinson. “This convergence of automation technology and information technology driven by Beckhoff enables us to have greater flexibility with our workforce, drawing from many different pools of engineering talent.”

TwinCAT 3 PLC and NC/PTP serves as the back-end for the DECI Duo system, providing real-time automation of the part processing operations. PostProcess has also standardised on a motion system from Beckhoff, consisting of AM8000 series servomotors with One Cable Technology (OCT) and several AX5100 EtherCAT servo drives. Hutchinson continues: “The AM8000 series motors fit our needs perfectly. Compact size and minimised cabling were at the top of our list of requirements, and these motors hit all the right marks. Plus, the combination of the OCT motors, servo drives and EtherCAT as the drives bus made commissioning very simple.”

Hutchinson explains the benefits of EtherCAT as system bus for the Hybrid DECI Duo: “EtherCAT is our sole communication protocol for all of the PostProcess Production series machines. The microsecond-level communication speeds are unparalleled. EtherCAT also supports flexible topologies and the use of third-party hardware.” EtherCAT I/O terminals are installed across all PostProcess Production lines. According to Hutchinson, this provides maximum flexibility and streamlines future expansion. Reduction in development time was the most important benefit realised by PostProcess. “With the Beckhoff system, our development time was cut in half,” reports Marc Farfaglia, engineering manager. “Much of this is due to the flexibility of TwinCAT 3 software and the ability to reuse function blocks and other code on subsequent machines.”

TwinCAT also provides further benefits for engineering, as it pairs very well with the Automat3D software. Hutchinson concludes: “The ability to utilise industry standard development tools and configuration management services, such as Microsoft Visual Studio, Visual StudioTeam Services and third-party extensions, greatly improves the development time, organisation and learning curve for our developers. As the 3D printing and additive manufacturing market continues to evolve at a rapid clip, it is exactly this level of flexibility that will help OEMs like PostProcess shape the future of the industry.”

For more information contact Michelle Murphy, Beckhoff Automation, +27 11 795 2898, michellem@beckhoff.com, www.beckhoff.co.za
Multi-mount cast iron electric motor range

In an industry first, Bearings International (BI) is introducing a multi-mount cast iron Bauer electric motor range onto the market that can accommodate the terminal box on the top, left-hand or right-hand side. The major benefit is that it reduces duplicate stockholding to accommodate different terminal box positions.

Traditionally, cast iron electric motors were available in a wide range from 0.37 up to 400 kW, with BI only catering for top-mounted terminal boxes. “Some plants either have top, left-hand or right-hand terminal boxes, making it a complex and costly exercise to stock all three,” explains product manager, Lewis Hiepner. “BI itself ordered whichever variant was required ex-factory, with a normal lead time of about 14 weeks.”

This is now all set to change with the industry’s first multi-mount cast iron motor. BI has contracted with a major manufacturer to produce what are termed loose feet, a bolt-on addition that transforms a normal motor into a multi-mount version that is adaptable to specific plant configurations. The Bauer motor range from BI is also available in various energy efficiency ratings, from IE1 as standard and IE2 high efficiency, all the way through to IE3 and even IE4.

The multi-mount motor range, being cast iron, is particularly robust, and therefore ideal for the arduous operating conditions of mining operations. “We have received significant interest in the new Bauer multi-mount range, combined with its energy saving potential,” Hiepner concludes.

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

Drives for sewage treatment applications

BMG supplies a range of drives designed specially for optimum efficiency in sewage treatment applications. “Nord drives, which consist of Unicase helical shaft mount geared motors, have special features to meet the requirements of water treatment procedures,” says national product specialist, Deon Crous. “These drives consist of gears, motors and brakes that are protected against corrosion. Special covers for the hollow shaft and motor ensure that the drive is resistant to spray from tanks and the humid and aggressive conditions in sewage treatment plants.” Explosion-proof motors, with electrical and mechanical speed control, are fitted with anti-condensation heaters for stand-still periods and reinforced bearings for extended life are standard. Special vent plugs, lubricants and a valve-type oil drainage facility also enhance performance in these demanding applications.

For more information contact Lauren Holloway, BMG, +27 11 620 7597, laurenhy@bmgworld.net, www.bmgworld.net
Cost-effective DC motor solutions

Vert Energy’s Leroy-Somer LSK direct current DC motors provide cost-effective solutions for variable speed applications. The major advantage of direct current motors is the ease of effecting accurate speed control, and LSK’s advanced technology enables motors to respond to electronic controllers, which place great demands on the performance of DC motors. Smooth running is achieved by the introduction of an advanced frame design, incorporating the largest dimensioned shaft. LSK square laminated frame DC motors, which have been designed by Leroy-Somer to the latest European standards for industrial requirements, have ratings from 2 to 750 kW. Leroy-Somer also produces non-standard motors, providing a range of power from 0.06 to 18.5 kW.

How to stabilise South Africa’s power supply

South Africa could go a long way to cutting the risk of future load-shedding by adopting a minimum efficiency performance standard (MEPS) for electric motors. According to Fanie Steyn, manager of rotating machines at Zest WEG Group, a MEPS would significantly reduce the peak power demand on the national grid. The step could be made at no cost to government and would also bring substantial savings to industry’s electrical energy costs.

“The MEPS would phase out the least-efficient electric motor classes by setting a minimum standard for the efficiency of motors imported and sold in South Africa,” he says. “The essential challenge now is that about 280 000 electric motors are imported each year, many of which are low efficiency motors rated at IE1 level as standard.”

Steyn highlights the great strides recently achieved in the efficiency of electric motors. Energy savings of between 2.1% and 12.4%, depending on the individual power rating, can be made by converting from a standard efficiency IE1 motor to a premium efficiency IE3 motor. The capital cost differential is slight and is quickly recouped by lower operating costs.

“It is estimated that as much as 30% of all energy produced globally is consumed by electric motors,” he says. “If the 150 000 low voltage motors entering the country each year were IE3 rated instead of IE1, the national grid could be relieved of about 195 million kWh in a single year,” says Steyn. “This means almost three billion kWh over the next five years.”

For more information contact Zest WEG Group Africa, +27 11 723 6000, info@zestweg.com, www.zestweg.co.za
Bosch Rexroth South Africa Group companies continue to invest in their production floors, with Hytec Engineering the latest Group company to optimise its manufacturing and repairs operation.

The acquisition of an additional 1000 m² of floor space; upgrades to shop equipment; as well as an optimised process flow of the factory that includes improved visibility of the shop floor are new investments that are allowing the hydraulic cylinders specialists to enhance the operational efficiency of its production capabilities.

Established in 1979, Hytec Engineering is one of the few hydraulics cylinder companies in sub-Saharan Africa with in-house cylinder design, manufacturing, testing and repair services in a single workshop. Its locally manufactured cylinders, which cover the complete fluid power spectrum up to 700 bar, are used in mining, materials handling, steel, oil and gas, marine and other industries. It is also one of a limited number of companies offering a hydraulic cylinder exchange programme as part of its cylinder services across Africa. And now, it boasts a remodelled ISO 9001-accredited facility geared towards maximum handling efficiency and an ergonomic, lean production flow, and meeting the most stringent health and safety standards.

**Optimised production flow**

The purchase of an additional 1000 m² of an adjacent work space has allowed the company to move most of the initial cylinder refurbishment facilities to this dedicated area. Here, cylinders sent for repairs from mining and industrial sites across southern Africa are cleaned, stripped and assessed prior to refurbishment. New equipment, such as an upgraded, state-of-the-art stripping bench delivering 1 350 000 Nm of torque, has enhanced the efficiency across the inspection and assessment process.

The main area of the workshop is now dedicated to component manufacture, assembly, testing and painting of the company's hydraulic cylinders via a redesigned production flow.

From rod manufacture, welding, barrel manufacture, the process flows to a preassembly area where quality of components is checked before entering the assembly line. At the end of the assembly line, the company’s high-tech, in-house designed cylinder test bench verifies the quality and conformance of cylinders to their precise design specifications. Once tested, the cylinders are ready for painting in the company’s new three-stage production booths.

Another new piece of equipment in the factory is the company’s sponge blasting facility, among the first applications of this technology in South Africa. Faster and far safer than traditional chemicals in removing paint and other superficial contaminants from repaired cylinders, while also not generating the hazardous quantities of combustible dust associated with shot blasting, the fully containerised sponge blasting facility is a critical part of this modern, optimised factory. In addition, this technique allows Hytec Engineering to provide special surface finishes on new manufactured cylinders as required by customers’ specialised applications.

**Complete process visibility**

Matching the company’s investments in new equipment and modernised production methodologies is its desire to gain greater visibility of the factory floor, and Hytec Engineering is the first of the Bosch Rexroth South Africa Group companies to introduce the Group’s new, sophisticated job tracking system to its workshop. This system automates and integrates information on the company’s complete production chain, from the availability of materials and OEM parts to the administration of the various tasks of the production floor onto a central, in-house developed platform that integrates into the Group’s enterprise resource planning system. This provides far greater intelligence in understanding the status, progress and predicted delivery dates of each project, down to a component level. For customers, this means greater accuracy and transparency in predicting the final quotation time frames, manufacturing lead times and delivery dates of their cylinder order or repair. This is based on algorithms considering longest lead time of materials, labour availability and machine availability. Customers will be able to receive automated reports about their products at their request.

**A factory floor for the future**

These investments have produced a modern factory process that is tailored to the company’s current operations, as well as towards meeting its expectations of growth, especially in the African markets, in the future. With a revamped, modern production floor geared to delivering new efficiencies of production of the company’s renowned cylinders, Hytec Engineering is ready to meet the needs of mines and industries across Africa with the highest quality fluid power solutions. These are the innovations that will ensure the company maintains its position as one of Africa’s leading hydraulic cylinder OEMs.

*For more information contact Pierre Goosen, Hytec Engineering, +27 11 387 1900, pierre.goosen@boschrexroth.co.za, www.hytecgroup.co.za*
Gates, a leading global provider of application-specific fluid power and power transmission solutions, has introduced the next generation of premium hydraulics with the new Gates MXT family of hoses. This innovative, patent-pending product line is a lighter weight and more flexible solution, that meets or exceeds a wide range of industry standards and addresses both replacement market and original equipment manufacturer needs. It is designed for applications across industries such as agriculture, mining, construction and other end-markets with demanding performance requirements.

“This innovative new product further demonstrates our ongoing dedication to push the boundaries of applied materials science and manufacturing processes to deliver solutions that meet the evolving needs of our customers,” said Ivo Jurek, CEO of Gates Industrial.

Tom Pitstick, CMO and SVP of Product Line Management, added: “Our customers want lighter, more flexible, easier-to-handle products that address multiple industry standards. They need to enhance the performance of their machines, simplify their engineering processes, improve operational efficiencies and streamline inventory with a simplified selection of products that can be used on virtually any original equipment platform. MXT delivers on these needs.”

Gates anticipates strong demand because MXT hoses deliver:

- More flexibility (up to 35% decreased force-to-bend), allowing for faster and more ergonomic installation.
- Lighter weight (up to 30% less) for improved fuel efficiency, easier handling and reduced shipping costs.
- A coverage of approximately 90% of the hydraulic wire braid product applications, meeting or exceeding multiple industry standards.

For more information contact Tania Bergmans, Gates Industrial, +32 53 76 27 17, tania.bergmans@gates.com, www.gates.com
The new 3- and 4-way solenoid-operated directional valves in the FLeX product family from Sun Hydraulics provide robust electro-hydraulic control for mobile and industrial applications. When paired with Sun's portfolio of pressure and flow control valves, these new directionals can help you manage a complete range of functions such as direction, position and power in the most demanding applications.

With these new additions to the FLeX family, it is now possible to create complete FLeX solutions for 210 or 350 bar applications that give 10 million cycle reliability at full rated pressure, 1000 hour salt fog protection and industry leading performance in a market priced solution. The new DMBD (210 bar) and DMBF (350 bar) 3-way directional valves are direct acting and are offered in two spool types. The FLeX Series DMB valves use the new T-150A cavity. Sun standard manifolds are available for the T-150A cavity. The new DNBD (210 bar) and DNBF (350 bar) 4-way, 2-position directional valves are direct acting as well and are offered in six spool types.

Sun has applied 50 years of valve design experience to the FLeX Series concept. We studied the future of fluid power, benchmarked the competition on performance and price and applied what we learned to develop these next-generation valves. With the addition of these new performance-driven directional valves, Sun now offers 28 FLeX Series directional valves, nine proportional valves and four relief valves that deliver the FLeX Advantage.

For more information contact Fritz Kern, Axiom Hydraulics, +27 11 334 3068, fritz@axiom.org.za, www.axiomsa.co.za
How the latest pneumatics can reduce plant costs

Growing demand for greater functionality and capability means that the latest pneumatic components are becoming increasingly complex. Plant engineers seeking cost-effective solutions need to know the optimum products available. Making wise selections when it comes to pneumatic components can pay huge dividends. To help avoid expensive mistakes, a variety of different pathways can be considered when looking to optimise the performance of pneumatic components.

Preventative maintenance
Regular and correct maintenance extends the working life of pneumatic equipment. Lubricators must not be left to run dry, while filters need cleaning, and contaminants such as water, unwanted oils, metal shavings and corrosion must be removed. A good visual indicator here is a yellowing of the filter elements, suggesting that compressor oils are causing an issue.

Predictive maintenance
Predictive maintenance avoids the cost of both reactive and scheduled preventative maintenance by only deploying maintenance routines when needed, namely shortly before a pneumatic component is predicted to fail. The route to predictive maintenance is via sensors. For instance, a flow sensor that sits in line with a filter, regulator, lubricator unit can indicate a blocked filter that might otherwise go unspotted.

If a blocked filter is allowed to continue serving a pneumatic system, several problems can result. Air supply can become restricted, contamination levels can rise, and extra heat can be generated that might compromise a system and ultimately lead to its complete failure. The cost implications of such an outcome are significant. Today, sensors have been developed for use on almost all pneumatic components, for example continuous position sensors on cylinders. This type of sensor can indicate whether heat or wear is being generated to the point of becoming a problem.

Reduce energy usage
Modern pneumatic components can help plants save money via reduced energy consumption. Many plant engineers fall into the trap of oversizing, thinking they are playing it safe. However, a correctly sized pneumatic component is perfectly safe and avoids the extra costs associated with larger pneumatics and wasted energy. A key tip here is to use pneumatic zoning on a manifold to mix pressures, add vacuum to the application, or manage the use of supply pressure. Pneumatic zoning allows the user to section the manifold via a gasket, thus creating different pressure zones or changing the flow, or even making one zone a vacuum. A further alternative to oversizing is to use pressure boosters, which amplify the pressure or serve as a simple reservoir to store compressed air in the system for later use.

Be safe, not sorry
There is a cost associated with ensuring machine/system safety, but workplace injuries will almost certainly cost more. A simple risk assessment can add significant value to a pneumatics project. Any potential hazards identified can be designed out or protected against using solutions such as light curtains, interlocks, machine guards or safety exhaust products.

When incorporated into an air preparation system, a safety exhaust valve lets users safely and reliably shut off the pneumatic energy, stopping the flow of compressed air to the machine and allowing downstream pressure to exhaust. There are, however, a number of criteria associated with the optimum specification of a safety exhaust valve, including fast exhaust time to faulted condition; fast switching time; utilising series-parallel flow so that both valve elements (redundant design) shift to supply air downstream; and high B10 value (life expectancy in switching cycles).

Consider system changes
Low cost Ethernet-based shop floor connectivity is the future for manufacturing industries, and many are shifting in this direction. In stark contrast, numerous plants still rely on hard-wired solutions. However, the shift from long runs of wire trunking to a simple Ethernet port is not as daunting as it sounds, particularly with the advent of IO-Link. This is fast becoming the next significant industrial network protocol as it can provide the perfect local extension to a superior industrial Ethernet network. It is the first I/O technology for communication with sensors and actuators to be adopted as an international standard (IEC 61131-9), meaning that devices can be integrated in the same way in all commonly used fieldbus and automation systems, right up to ERP level. The opportunity to save money with IO-Link is substantial as users can run field level devices back to the IO-Link master, which saves in time, wiring, component costs and troubleshooting. What’s more, today’s advanced network nodes come with many advantages, such as prognostic data for predictive maintenance, as well as built-in sensors for shorts, over-current, thermal management and cycle counting.

For more information contact Lisa de Beer, Parker Hannifin SA, +27 11 961 0700, lisa.debeer@parker.com, www.parker.com/za
BMG has been appointed by Ingersoll Rand as distributors of the ARO Pro series diaphragm pumps. ARO air-operated diaphragm pumps have been designed to pump virtually any type of liquid with ease – ranging from clean, light viscosity fluids, to highly corrosive and abrasive fluids. They can also transfer large particles without damaging the pump. This range is suitable for general industrial and OEM installation applications in diverse industries, including chemical and petrochemical, energy, pharmaceutical, mining, oil and gas, and water and wastewater.

Notable features include a seal-less, self-priming design, with low material shear and minimal maintenance requirements. These portable pumps are easy to install and can run dry without damage. Most ARO diaphragm pumps are ATEX certified (CE Ex11 2GD X), enabling safe use in potentially explosive areas. This feature makes them ideal for underground applications such as dewatering.

ARO Pro series air-operated diaphragm pump air motors, which are lubrication-free, have positive sealing characteristics and make use of a specially designed unbalanced air valve to prevent stalling issues associated with operation at low pressures. Exhaust valves divert cold air away from components that are prone to ice build-up.

ARO pumps allow users to vary the flow outlet and discharge pressure from 1 litre per minute, up to 1040 litres per minute for larger sizes and to adjust fluid pressure up to 8.5 bar using an air filter/regulator and a needle valve. Metallic and non-metallic air-operated diaphragm pumps are available in various materials and porting configurations to suit numerous applications, including transfer, loading/unloading/filling, re-circulation, system flushing and batching/blending.

For more information contact Lauren Holloway, BMG, +27 11 620 7597, laurenhy@bmgworld.net, www.bmgworld.net
Swedish equipment manufacturer, Ecme, has developed a high-tech machine for a supplier to the automotive industry that can complete several process steps simultaneously without having to remount the part being worked on. The machining centre is designed for high volume production of up to 200 000 parts per year and performs its functions and processing steps simultaneously within the same cycle. The machine reduces the previous processing and conversion times by more than one third, while requiring less of the valuable shop floor space.

Beckhoff supplied TwinCAT 3 automation software for the Ecme machine’s PLC and NC operations as well as the main spindle and forward-feed drives.

From the drawing board to the finished machine in record time

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

The challenges were considerable. Parts that were previously made on two machine tools with three to five axes had to be processed by a single machine operating 18 NC axes simultaneously. Two main spindles are designed as four-axis units, meaning they can move freely along the X, Y and Z axes as well as rotate and tilt. Another three main spindles move as three-axis units supplemented by an additional one-axis main spindle. With this configuration, workpieces can be machined on all sides without having to be remounted.

Precise motion control with faster response times

“Addressing all 18 axes simultaneously requires a fast and powerful control system, which is where Beckhoff came into play,” says Eklund. “Beckhoff was able to meet all the customer specifications. The flexible hardware design was another reason for the decision to select Beckhoff technology. The Beckhoff system is very powerful and easy to operate, which is something we truly appreciate. It is a prime example of German engineering.”

At the core of the machine is TwinCAT 3 NC software, which controls the six mechanical spindles simultaneously. As a highly scalable system, PC-based control also provides the best possible hardware platform for this application. The TwinCAT real-time kernel and the ultra-fast system communication over EtherCAT offer ideal conditions for high-precision motion control.

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

Control and drive components from a single source

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

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

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

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

SEW-EURODRIVE - Driving the world
Contactless energy transfer system for automotive assembly line

The Movitrans contactless energy transfer system from SEW-Eurodrive, in conjunction with its Movipro SDC decentralised drive, position and application controller, has played a critical role in an assembly line extension at a major automotive producer in Port Elizabeth.

The big advantage of the Movitrans system is that it is based on contactless energy transfer. In this system, electrical energy is transferred without contact from a fixed conductor to one or more mobile consumers. The electromagnetic connection is made via an air gap. Not being subject to wear has the added benefit of it being maintenance-free. In addition, this type of power supply is emission-free, and therefore environmentally friendly.

“Movitrans is the ideal supply system for all mobile applications, and has been tested according to BGV B11. It is perfect for equipment that has to cover long distances at high speeds, for example, or if maintenance-free operation is required. It is also suited for applications in sensitive environments where outside contaminants are not permitted, and in wet and damp environments,” explains electronics support technician, Juandré La Cock.

Wherever a trolley/skillet (conveyor) system is implemented, such as with an automotive assembly line, a custom designed drive concept is required that must correspond to the necessary load bearing capacity, the desired transport speed, the existing space restrictions, and the specific ambient conditions of the application.

Here the Movipro SDC is an ideal solution for both horizontal and vertical trolley/skillet applications. It not only integrates all necessary functions, but allows for decentralised installation of up to 15 kW. The solution is characterised by its design robustness, especially in terms of reliability and precise positioning requirements. With its modular, standardised design and freely configurable software components, this decentralised drive and positioning control system facilitates the integration of numerous functions, while reducing the complexity of the machine or system.

At the Port Elizabeth plant, SEW-Eurodrive was required to replace an existing Movitrans system installed originally in 2006, in order to be able to add a further four skillets to the existing line. La Cock explains that this was done in order to upgrade the technology to the latest iteration developed by the research and development department in Germany.

The Movipro SDC provides wireless communication for the Movitrans system, based on WiFi routers. Adding to the complexity of the solution required is the fact that the 30 different stations along the assembly line have different height requirements. “This means we had to design a height table into the system,” La Cock points out.

SEW-Eurodrive’s scope of work on this project was not only to commission the extension of the assembly line, but also to ensure that the entire plant was up to date with the latest technology. “This involved resetting all of the Movipros, replacing and extending the leaky WiFi cable, and then replacing the Movitrans system with the latest version,” La Cock continues. He adds that since its original installation in 2006, the entire system has functioned flawlessly.

While SEW-Eurodrive’s Maxolution has developed products and solutions specifically for the automotive industry, La Cock stresses that the system supplied for the Port Elizabeth project has been customised specifically for the automotive manufacturer. “This demonstrates our flexibility in being able to adapt to specific client requirements, and also how we ensure our long-standing clients remain up to date with the latest developments,” he concludes.

For more information contact Jana Klut, SEW-Eurodrive, +27 11 248 7000, jklut@sew.co.za, www.sew-eurodrive.co.za
For the first time we bring together our core global motion control technologies in a single unifying force. Through insight, intelligence and innovation we provide solutions to meet the increasingly complex demands. This is Parker helping to solve the world’s greatest engineering challenges.
Nature impressively teaches us what the ideal propulsion systems for certain types of movement in water looks like. The BionicFinWave was inspired by the undulating fin movements executed by marine animals such as the polyclad or the cuttlefish. With this form of propulsion, the underwater robot manoeuvres itself autonomously through a system of acrylic glass tubing. This project provides impulses for future work with autonomous robots in the process industry.

With this technology carrier, Festo is once more creating impulses for future work with autonomous robots and new drive technologies for use in fluid media. Concepts like the BionicFinWave could possibly be further developed for tasks such as inspection, measurements or data acquisition, for example for water and wastewater technology or other areas of the process industry. The knowledge gained in this project could also be used for methods in the manufacturing of soft robotics components.

Swimming like the natural model
The longitudinal fins of the polyclad and the cuttlefish extend from the head to the tail along their backs, their undersides or the two sides of their torsos. To move through the water, the animals use their fins to generate a continuous wave that progresses along the entire length of their bodies. This so-called undulation forces the water backwards, thereby producing a forward thrust. The BionicFinWave also uses this principle to manoeuvre itself forward or backwards.

This has enabled Festo to technically realise a fin drive unit that is particularly suitable for slow, precise motion and causes less turbulence in the water than a conventional screw propulsion drive, for example. While it moves through the tube system, the autonomous underwater robot can communicate with the outside world via radio and transmit data such as temperature and pressure sensor readings to a tablet.

Flexible silicone fins as integral components
The two lateral fins of the 370 mm long BionicFinWave are moulded entirely from silicone and dispense with reinforcement struts and other supporting elements. They are therefore extremely flexible and can realistically emulate the gently flowing movements of their biological model. To carry out the movement, each of the two fins is attached to nine small lever arms with a deflection angle of 45 degrees. These are driven by two servo motors housed within the body of the underwater robot. Two flat crankshafts transmit the forces to the arms so that the two fins can move independently of each other. By this means, they can simultaneously generate different wave patterns. To swim in a curve, for example, the outer fin moves faster than the inner one – as with the treads of an excavator.

The BionicFinWave moves upwards or downwards by bending its body in the desired direction. To make the crankshafts suitably flexible, universal joints are located between the lever segments. The crankshafts, together with the joints and piston rod, are made from plastic as integral components in a 3D printing process.

An optimally designed body with integrated onboard electronics
The remaining body elements of the BionicFinWave, which weighs only 430 g, are also 3D-printed. This enables the complex geometry to be realised. With their cavities, the body elements function as floats. At the same time, the waterproof cavities offer a safe location for the entire control and regulation technology within a very small space. A pressure sensor and ultrasound sensors constantly register the BionicFinWave’s distance to the walls and its depth in the water, thereby preventing collisions with the tube system. This autonomous and safe navigation required the development of compact, efficient and waterproof or water-resistant components that can be coordinated and regulated by means of appropriate software.

For more information contact
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The Metal Work EB80 BOXI Valve Island, now also available with IO-Link, is a suitable candidate for end of arm tooling (EOAT). This is an integral part of robotic technology. It refers to the equipment that interacts with other parts and components of the manufacturing process, typically at the end of a robotic arm. The EOAT gives a robot a specific functionality and can be changed to fit different applications or even be built to accommodate several processes at once. Either way, advancements in EOAT capabilities are parallel to advancements in robotic capabilities.

Pneumatic EOAT’s have proven to be the most popular, since they are easy to integrate, are energy efficient and pack a lot of power in a small package. Pneumatic grippers are a popular EOAT for robots, as pick and place applications are prime targets for automation and the gripping capabilities of robots have advanced significantly in recent years.

The Metal Work EB 80 electro-pneumatic valve island system features the utmost modularity and allows for the construction of all types and sizes of valve islands. IIoT ready, with most of the commonly used Fieldbus protocols or multi-pin connection available, this solution has enormous potential. This potential, however, is not commonly exploited to the full when only a few valves are needed and there is no need to manage electrical input or output signals.

The EB80 BOXI was designed to best meet the requirement for simplicity. It consists of a solid base that accommodates pneumatic and electrical connections, all electronics and up to four valves. A comparison with a modular EB 80 for four valve shows that BOXI weighs 35% less and saves 30% space, in addition to its competitive price, while maintaining many of the advantages that have made the EB 80 so popular, namely:
• All the valve functions from the trusted EB 80 range can be installed.
• The island can be powered at 12 or 24 V DC.
• Fully interchangeable cartridge fittings.
• Energy consumption of only 0.3 W for each valve.
• Diagnostics (open circuit, over-under voltage and short-circuit) with LED indication lights.
• Possibility of connecting multi-function modules to the pneumatic outputs.

There are two options for the electrical connection, a 9 pin multi-pin connection (digital hard wired) and an IO-Link option. With IO-Link, the control signal of the valves and the power supply can be conveyed in a single standard M12 connector (Port Class A or A-Coded). If the IO-Link master cannot supply enough electrical current to the valves or if you want to keep the signal separate from the power, it is possible to use a special connector to dedicate an auxiliary electric power supply (M8) separate from the control signal (Port Class B or B-Coded).

For more information contact Johan Bester, Metal Work Pneumatic South Africa, +27 31 569 1584, johanb@metalworkpneumatic.co.za, www.metalworkpneumatic.co.za
Robotic Navigation: How do you navigate agricultural robots through a field? The major challenge of this application can be found not only in the wide variety of crops out there, but also in the fact that crop rows are neither completely straight nor all the same width. Now, Wageningen University and Research Centre has developed a solution that uses SICK Automation’s LMS111 2D laser scanner.

Precision agriculture
Precision agriculture is on the rise, but what does it mean? It is a practice that marks a move away from the model of subjecting every field to a standard treatment and instead takes a semi-tailored approach that considers the requirements of each crop. Custom sowing, fertilisation, pesticide application and disease control have the potential to not only save money, but also reduce the impact on the environment.

However, the more efficient benefits that precision agriculture brings are unfortunately not yet enough to outweigh the performance of the large, fast farm machinery that saves significant quantities of manpower.

Recently, however, a solution to this problem has been introduced in the form of small agricultural robots that are able to work in fields 24 hours a day, slowing down or stopping as the situation demands, and operating almost entirely without human input.

Navigation without GPS
A good navigation system is one of the fundamental requirements for using agricultural robots successfully. The system must be able to account for deviations in the shape and size of crops, crooked rows of differing widths, as well as other irregularities.

Standard GPS systems are not up to the job. For this reason, the Wageningen University and Research Centre developed a navigation process in which robots would be guided not by a GPS function, but instead by an LMS111 2D laser scanner from SICK Automation.

The LMS111 2D laser scanners collect raw data and then filter the information needed out of this. A whole range of practical tests were performed during the growing season to check whether the system was functioning as it should. The results proved that it is indeed a reliable solution for navigating crop areas cultivated using conventional methods.

Summing up, Dr Frits van Evert from Wageningen University and Research Centre states: “We have invested a great deal of time and energy in this project. Just recently, our efforts put us in a position to publish our findings in a leading scientific journal. I would therefore like to express my sincere thanks to SICK for providing us with the laser scanner for our research.”

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The future of collaborative robots

Factories worldwide are dealing with the challenges of manufacturing a wide variety of low volume products to meet customer demands, as well as shorter product life cycles and labour shortage issues. Collaborative robots that can work safely in the same environment with people have an important role in enabling flexible manufacturing and creating a competitive advantage. A new generation of collaborative robots (cobots) is emerging in response to the needs of Industry 4.0. In applications where flexibility is key, as opposed to maximum production speed. Cobots are now filling the gap in the robotics market with their user-friendly software tools and integrated sensory functions, which now include machine vision systems, location capabilities and integration with warehouse systems.

Cobots do heavy lifting
Cobots are gaining strength. Although lightweight, the Omron Techman TM14M for example can lift goods up to 14 kg. While compliant with the ISO 10218 safety standard, which describes the interaction of robots and humans, cobots are now becoming actual team members in production and logistics environments thanks to their lifting capabilities.

Cobots can be deployed in a wide range of applications, such as production, testing, quality control, packaging and palletising, as well as intralogistics. For example, it is possible to support people in assembly processes at those stages where precision and repeatability are key. These robots can apply adhesives and seals with simultaneous quality control. Thanks to repeatability, they are also perfectly suited for automating complex quality tests. Being able to do heavy lifting, they can also be used as palletisers.

Cobots are on the move
The new generation of cobots can be easily integrated with mobile robots. This cooperation is made possible by the low weight of the latest robots, as well as the possibility of building mobile platforms on mobile robots, such as the Omron LD autonomous intelligent vehicle. Cobots can now be a natural part of a flexible, constantly evolving production environment. Cobots installed on mobile robots can become elements of innovative logistic solutions and provide complete sub-assemblies and semi-finished products for assembly stations and finished products to be placed in stock or quality control stations. They can effectively complement and augment people's work in many discrete manufacturing processes.

Cobots are becoming smart
Cobots are just beginning to enable innovation and competitiveness. Undisputed advantages of cobots are the high versatility and a wide range of possibilities, including the ability to carry out tasks performed so far by standard robots, all easily configurable by local engineering staff. With a much easier implementation resulting from the reduced need to provide security measures, and incomparably greater flexibility of operation, the return on such investment can be very positive.

Adding the capabilities of machine vision combined with artificial intelligence into the mix results in limitless possibilities. A cobot can have a built-in intelligent vision system which provides totem pairing, object position, bar code identification, colour differentiation, and other vision functions. You can use gestures to guide the robot and the task by hand, as well as change the degree of freedom of the hand-guide function freely according to different conditions.

Omron’s interactive tennis table robot, Forpheus demonstrates the possibilities of artificial intelligence (AI) combined with cobots. Forpheus combines vision with robotics and artificial intelligence on the machine level. It can play an interactive game and identify ping-pong balls in a 3D space in an identical way to the human visual system, as well as evaluate players and judge their ability level, while a high-speed robotic arm moves in response to its AI controller, for example predicting smashes. Combining artificial intelligence on the machine level to vision systems and mobile cobots opens up even more exciting possibilities for new industrial applications in the future.

What does the future hold for Omron?
Omron and Techman Robot recently signed an agreement to form a strategic alliance in the area of cobots. They will provide cobots that can be used for a wide variety of applications such as electronics assembly, product testing and inspection. These robots will enable flexible manufacturing and increase the productivity and quality of production lines for customers in the automotive and electronic industries, as well as various material handling operations within a broad range of manufacturing industries, to realise an innovative manufacturing environment where humans and machines work in harmony.

For more information contact Omron Electronics, +27 11 579 2600, info.sa@eu.omron.com, www.industrial.omron.co.za
One of the regions we know very little about is the dense part in the centre of the galaxy, where countless stars and gas clouds cluster around a presumed black hole. But a major astronomy project is about to close many knowledge gaps. The project was commissioned by the European Southern Observatory (ESO), which operates some of the world’s most powerful telescopes in the Chilean Atacama Desert. This includes the Very Large Telescope (VLT) with a mirror diameter of 8.2 metres at the Paranal Observatory.

The goal of the project is to equip the VLT with a new instrument to capture optical signals from space. The instrument in question is a spectrograph, which is capable of simultaneously capturing a large number of cosmic objects in the visible and infrared part of the spectrum. Its abbreviated designation gives the project its name: Multi-Object Optical and Near-infrared Spectrograph, MOONS.

With this new technology, MOONS opens up entirely new possibilities in observing space. It captures minute details. The huge lens and mirror of the VLT are pointed at the part of space that is to be observed. Then the ends of exactly 1001 optical fibres in MOONS are aligned to individual objects within this cosmic region. Its abbreviated designation gives the project its name: Multi-Object Optical and Near-infrared Spectrograph, MOONS.

With this new technology, MOONS opens up entirely new possibilities in observing space. It captures minute details. The huge lens and mirror of the VLT are pointed at the part of space that is to be observed. Then the ends of exactly 1001 optical fibres in MOONS are aligned to individual objects within this cosmic region. Instead of capturing the entire selected area like a camera, the new instrument focuses the fibres on certain points in the universe. These points are not just photographed, but instead their light is separated by prisms into different wavelengths.

“...This method yields much more information than an image,” explains Dr Taylor at the UK Astronomy Technology Centre (UK ATC). “It allows us to calculate its dynamics – the velocity and direction of movement. Because MOONS captures the near-infrared spectrum, we can precisely analyse the redshift that the light from distant objects travelling to us is subjected to.”

One of the objectives of the project is to create a 3D map of the Milky Way, which would allow GPS navigation throughout our galaxy. “The MOONS technology with its unprecedented resolution enables us to look very far, and thus also very far back in time. We will be able to approximate the Big Bang to within a few hundred million years. This will give scientists insights into the universe’s infancy. We will be able to map the Universe to an unprecedented depth,” adds Taylor.

The astronomers aim to target several million objects over a period of about five years. To reach that aim, the 1001 optical fibres of the spectrograph have to be pointed at the cosmic targets quickly and mostly automatically. This is achieved with an equal number of fibre positioning units (FPUs). Each FPU has two stepper motor drive units fitted to reduced backlash spur gearheads. The one in the back moves the central axis of the FPU. Eccentrically mounted on this, the front motor-gearhead drive unit simultaneously moves the fibre tip. The combination of the two axial movements allows each FPU to cover a circular area, within which the fibre can be randomly aligned. This area partially overlaps the areas of adjacent FPUs. That means that every point within the capture zone can be controlled.

To meet the challenging requirements in terms of positional repeatability, which is a must to avoid collisions between FPU end tips, the drive system solution has to be extremely precise. To ensure the required precision and to avoid collisions between the FPU tips, the systems must operate with high repeatability. The high quality stepper motors come from Faulhaber Precistep; the zero backlash gearheads from Faulhaber Minimotor contribute to the positioning accuracy.

The high precision and extreme reliability of the components allow the control to be kept simple. Complex electronics and control logics would severely impede the quick and simultaneous control of 1001 units. Thanks to the high quality of the components, precise alignment is achieved by means of simple open loop control. The technology must also be very sturdy and virtually maintenance free in order to perform its tasks without interruption over the planned ten year service life of the system.

Project manager, Dr Alasdair Fairley is already looking beyond such technical concerns. “We are confident that the FPU will remain fully operational for ten years without maintenance,” he concludes.

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AEROSPACE

New docking system for space rendezvous

The European Space Agency (ESA) is working on a new system to enable easy docking between two spacecraft. maxon motor developed two special drive systems for this purpose. Even though it has been done many times before, the docking manoeuvre between two objects in space is always a delicate and potentially dangerous procedure. The speed is extremely high, about 28 000 km/h in the case of the International Space Station (ISS), and corrections are difficult. For example, when the two objects are about to meet, manoeuvring thrusters can no longer be used, since their exhaust plumes can cause damage. To prevent harm, cargo transporters are caught by a robotic arm installed in the ISS and berthed manually. Manned spacecraft on the other hand dock directly in a computer-controlled process.

This type of docking manoeuvre is going to become easier and safer in the future, so the European Space Agency (ESA) has commissioned its industry partners to design a new docking system called International Berthing and Docking Mechanism (IBDM). The mechanism's first missions will be with the Dream Chaser, a craft that will soon perform cargo flights to the ISS.

Docking energy is absorbed

The IBDM is an androgynous coupling system. This means that the connector is identical on both sides. It consists of a hard inner ring (Hard Capture System) and a soft outer ring (Soft Capture System) that has six degrees of freedom and force sensors. The outer ring first absorbs the docking energy. Then the final airtight connection is made and secured by mechanical hooks which pull the two spacecraft tightly together.

SENER is in charge of developing and installing the Hard Capture System. The company is currently working on the qualification model, which is due for testing in 2020. “The IBDM needs to be used as quickly as possible on a supply flight for the ISS,” says SENER's Gabriel Ybarra. “One of the next steps would be to use it in NASA’s Lunar Space Station, which is planned to go into orbit around the moon and could serve as a launch point for manned missions to Mars in the future.”

Dual systems for maximum safety

This is a challenging project for the engineers at SENER: “We first needed to fully understand all the requirements set by ESA and NASA, especially with regard to safety, because the docking mechanism can also cope with manned flights,” continues Ybarra. “As well as being lightweight and delivering the required torque, the electrical drives that are used must also be extremely reliable. This is why SENER has been working with drive specialist maxon for several years.”

For the hard capture system maxon developed an EC 32 flat motor with two windings and a GPX 22 UP planetary gearhead. There are twelve maxon drive systems powering the locking hooks. Each consists of two brushless EC-4pole motors and a GPX 42 UP gearhead.

maxon’s engineers have developed two drives that can be used to execute a huge variety of functions. This first drive consists of two brushless EC-4pole 30 motors and a GPX 42 UP gearhead.

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For the other drive system however, the maxon engineers found a different, unconventional solution: an additional stator is used instead of an extra motor. The flat motor therefore has two stators and hence two windings, each of which is capable of independently driving the rotor – an ingenious solution, which guarantees safety while saving space.

Ybarra praises the collaboration with maxon: “The team understands our requirements and is very quick with design modifications. Moreover, both partners have a passion for mechatronic systems. It feels great to be involved in the entire cycle, from design to production and testing. This makes it extremely interesting. And when the system moves for the first time, it’s like watching your children take their first steps.”

For more information contact Hans Burri, DNH Tradeserve, +27 11 468 2722, hans.burri@dnhtrade.co.za, www.dnhtrade.co.za
**New bolting solutions**

BMG’s Nord-Lock bolting solutions now include Boltight hydraulic bolt tensioning tools, which are used to tighten bolts simultaneously, ensuring even preload in industrial applications and extreme environments, where bolt load accuracy is critical.

Boltight hydraulic bolt tensioners, manufactured to stringent global quality and safety specifications, use high pressure hydraulics and a predetermined pressure to make on-site bolting jobs safer, faster and more efficient. These tools have been specially developed to axially stretch the bolt. The nut is then rotated down the joint face, accurately locking in the bolt load.

The Boltight operating principle is based on the flow of hydraulic oil into the load cell. The load generated by the load cell is transferred into the puller and the puller then transfers the load directly into the bolt. The nut lifts clear of the flange surface due to bolt stretch and the socket is used to turn the nut down, retaining the load. Boltight hydraulic bolt tensioning equipment is suitable for use in all industries where critical bolting requires accurate and reliable tightening. In power generation, these tools are used for bolts on pipes, pumps, valves and engines.

Boltight tools are also used extensively throughout the oil and gas industry, where reliable and accurate bolt tightening is critical to operational efficiency. Standard bolt tensioners are used on onshore and offshore pipeline flanges, compact flanges, heat exchangers, cranes, pumps, valves and for other critical bolting applications. Xtra load bolt tensioners are recommended for higher loads and for restricted space applications.

**Power-factor correction to cut energy costs**

Power-factor correction is a mechanism to reduce operating costs associated with electricity consumption. Some of the key advantages are reduced KVA charges, improved plant efficiency and network voltage and reduced overloading of cables, switchgear and transformers.

ElectroMechanica (EM) product manager, Artur Socha explains that the power factor is simply the ratio of actual power (known as active power) used in a circuit, expressed in kW, to the mains power drawn, expressed in kVA. Large industrial, commercial, or retail operations can have maximum demand charges applied to their electricity bill.

Improved power factor relates to immediate savings on the demand charges. Even sites that have switched to renewable energy sources such as solar still need to take power factor into account.

To determine the estimated savings that can be realised by installing a power factor correction system, EM recently launched a power factor correction calculator to allow customers to determine savings if they are being penalised on their electricity bills with a maximum demand charge. Combined with active harmonic filters, it provides complete solutions for all aspects related to power factor and power quality requirements.

Two main products from EM play a key role in power-factor correction, the Lovato DCRG power-factor correction controllers and Electronicon three-phase cylindrical capacitors.

**Leak testing for waterproof products**

For more than forty years, ATEQ has been well-known in the quality testing industry as a company that manufactures highly accurate industrial leak testing instruments. Many applications that ATEQ has tested have been in the automotive, industrial and medical industries, but within the last few years ATEQ has taken its expertise into the consumer electronics industry.

One of the hottest trends in the electronics industry is waterproof products. To be classified as waterproof, each opening on a device must be thoroughly leak tested to ensure that it meets the desired IP certification standards. For example, if a smartphone achieves an IP67 waterproof rating, that means the device is fully protected against dust getting into the phone and can withstand being submerged in water for up to 30 mins in 1m depth. ATEQ’s leak testers use pressure decay air leak testing to measure pressure drops, which determine the air leak rates within the device.

After successfully providing custom waterproof testing solutions to several major smartphone and smartwatch manufacturers, ATEQ was encouraged to broaden its reach into this industry by exhibiting at the world’s largest annual tradeshow, the Consumer Electronics Show in Las Vegas, for the first time. It was determined that there is a large growing global demand for companies like ATEQ, that can provide waterproofing consulting and testing equipment to electronics manufacturers.

For more information contact Drikus Odendaal, ATEQ South Africa, +27 11 608 1440, drikus@ateqsa.co.za, www.ateq.com
Speedy, reliable loop valve testing

Fluke’s new 710 mA loop valve tester allows technicians to source the 4-20 mA signal while it interrogates HART data to collect critical information about a valve’s position and status, providing quick checks of control valves while they are in place. With built-in test procedures and an intuitive interface, the Fluke 710 allows technicians to quickly and easily perform valve tests, while the valve test quick-check results provide at a glance diagnostics to make faster maintenance decisions.

With the tester’s built-in HART communication function, technicians can source a 4-20 mA signal to cause the smart control valve to move, while simultaneously interpreting the valve’s HART feedback signal to determine whether the valve is moving to the expected position. In addition to positional information, the measured pressure delivered from the valve’s internal I/P (which moves the valve) can be seen with the HART communication protocol.

These preconfigured valve tests allow reliable and repeatable testing. Test results are stored in the memory, where they can be uploaded to the included ValveTrack analysis software.

Gates, a leading global provider of application-specific fluid power and power transmission solutions, has achieved enhanced levels of protection from red rust through the innovative use of materials science and process engineering. New plating techniques were developed to protect the DIN 2353 hydraulic fittings range from the natural ageing and degenerating processes, which in turn allows end-users to reduce scheduled maintenance costs by extending product life.

Randomly selected components were tested by the highly respected and DAkkS accredited IGOS Institute of Solingen (Germany). After extensive salt spray tests, which simulate the aggressive atmospheric conditions that generate attacks by red rust, the protection delivered by Gates DIN 2353 fittings proved over 500 hours above the recognised industry standard of 720 hours.

“Scheduled maintenance programmes are subsequently reduced,” says Gates business unit director, Ben Rooke. “This represents significant cost savings and these can be shared with our distributors and end-user customers.”

Gates operates within a culture of service that listens to the requirements of its distributor partners and end users, responding with practical market solutions. By incorporating market feedback into their product development cycle Gates can lower the overall cost of ownership of capital equipment for end users, delivered through the following benefits:

- Fewer replacement and maintenance cycles.
- Less downtime as a result of longer life surface coating.
- Savings in the cost of replacement parts.

As a manufacturer of DIN 2353 fittings for original equipment manufacturers in a wide range of industrial sectors, the Gates manufacturing standard is a leading benchmark for quality across its entire DIN parts range.

For more information contact Tania Bergmans, Gates Industrial, +32 53 76 27 17, tania.bergmans@gates.com, www.gates.com

Portable differential pressure measurement

Instrotech is offering Kobold’s highly precise pressure measuring devices HND-P121/P231 to HND-P127 with integrated pressure sensors. They have two pressure measurement inputs on the top of the housing that are connected to the measuring points by means of a stable metal connection and plastic hoses which are available as accessories.

Numerous measuring ranges in the overpressure and underpressure range are available for various measurement tasks, such as differential pressure measurement. In addition to pressure display, these first-rate, compact, universally applicable measuring units offer additional functions such as minimum/maximum value memory, a hold function, tare function, automatic self-shut-off, or zero point offset.

The devices with an expanded spectrum of functions also have a logger function, a peak value memory, minimum/maximum alarm, an adjustable measuring cycle, and averaging.

Key features include:
- Integrated pressure sensor.
- Differential pressure measurement.
- Two hose connections.
- Serial interface.
- Extensive additional functions.
- Relative pressure sensors.

Areas of application are chemical, pharmaceutical and food industries and machine and apparatus construction, as well as piping and container construction.

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

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

Hydraulic tube fittings exceed red rust corrosion standards

Instrotech is offering Kobold’s highly precise pressure measuring devices HND-P121/P231 to HND-P127 with integrated pressure sensors. They have two pressure measurement inputs on the top of the housing that are connected to the measuring points by means of a stable metal connection and plastic hoses which are available as accessories.

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For more information contact Comtest, +27 10 595 1821, sales@comtest.co.za, www.comtest.co.za
Enerpac range for A-to-Z solutions

Well-known for its power tools and compressor systems, Ingersoll Rand’s heavy lifting equipment is now also being introduced to South Africa by Mandirk Lifting, part of the Mandirk Group. Combined with its leading Enerpac brand, Mandirk Lifting can now offer clients in a diverse range of industries complete solutions based on the best brands and highest quality equipment to result in the lowest total cost of ownership.

“We are taking our two leading brands and combining them in complete A-to-Z solutions,” explains Mandirk Lifting GM, Jaco Vorster. Mandirk Lifting will focus initially on the Kinetic series of manual and lever hoists. These premium manual chain hoists are engineered for arduous environments, and deliver exceptional durability. The grade 100 electro-motorised hoists are engineered for arduous environments, and deliver exceptional durability. The grade 100 electro-motorised hoists are engineered for arduous environments, and deliver exceptional durability.

“Ingersoll Rand’s heavy lifting equipment is now also being introduced to South Africa by Mandirk Lifting, part of the Mandirk Group. Combined with its leading Enerpac brand, Mandirk Lifting can now offer clients in a diverse range of industries complete solutions based on the best brands and highest quality equipment to result in the lowest total cost of ownership. We will also offer related lifting products from Ingersoll Rand such as electric hoists with motorised trolleys, pneumatic hoists, galvanised chain, cast hook latches, an all-steel construction, and spring balancers,” Vorster adds.

Enerpac has launched 14 products this year alone, from new products to upgrades. The former includes a new range of hydraulic cutters and pullers, as well as telescopic cylinders that can cope with a low collapse height and provide a lower base for a higher jacking point. Other new products include a 28 V battery power pack; and a new range of heavy lifting cylinders features a nitrous oxide coating for protection against rain to prevent rust and corrosion from compromising their integrity.

For more information contact Jaclyn Bilson, Mandirk, +27 11 922 5300, jbilson@mandirk.co.za, www.mandirk.co.za

Cut costs with high quality lubricants

In a tough economic climate, South Africa’s mining and cement sector players face numerous challenges that put them under pressure to maintain profitability by cutting costs. However, rather than using cheaper maintenance products, companies need to protect and manage their equipment more carefully, particularly in harsh operating environments.

Open-gear lubricants and greases distributed by LE Incorporated protect against machine failures and improve the performance and longevity of equipment. National marketing manager, Callum Ford says that gears used in mining and cement production experience high wear and have to be replaced often. Investing in the right lubrication solution can drastically cut down on wear and tear, especially on large open gears that perform at a high intensity in challenging conditions.

He explains that using high quality lubricants can also reduce the volume of lubrication products that a plant or mine needs, so operating costs decrease when using higher grade products. “One of our mining clients switched the lubricant on their mill drill motor to our Pyroshield 9011 XHvy high viscosity oil, and saw the drill motor moving from operating at between 5,6 and 5,4 MW to between 5 and 4,6 MW, an energy savings of 12%, while maintaining the same production output,” he says. “Monthly lubricant consumption also dropped from 800 kg per month to 80 kg.”

“For mines and cement factories looking to cut costs, the answer may not be to use cheaper products, but rather to find quality equipment maintenance products that require lower volumes to achieve their purpose and increase the longevity of machinery,” Ford concludes.

For more information contact Callum Ford, Lubrication Engineers, +27 11 464 1735, callum@lubricationengineers.co.za, www.lubricationengineers.co.za

Spring cable reels

The SR-Express range from Powermite, which forms part of Conductix-Wapfler’s global SR series of spring cable reels, is engineered to meet the energy and data supply requirements of virtually any moving machinery, from overhead bridge cranes, gantries and mobile tables to aerial ladders, lifts, elevators and elevated work platforms.

All components, from the cables and cable drum to the slip rings, springs and mounting flange, are manufactured from the best and most durable materials to ensure optimum operational efficiency over a long life cycle. The flank edge has optimises cable arrangement during winding, ensuring operator safety. With winding diameters ranging from 170 to 400 mm, the cable drum is fitted with sealed ball bearings and is lubricated for life.

The USR heat-resistant slip rings reduce maintenance. For optimal access to connection, the slip rings are located in an impact-resistant housing outside the cable drum. The rugged and versatile IP65 rated range is protected against dust and water ingress and is able to withstand an impact of 20 joules. The units continue to deliver optimum performance even in the most stringent of conditions, with an ambient temperature range of -20 up to 60°C for the standard E0 environmental specification and as low as -40°C for the E1 specification.

Suitable for both indoor and outdoor applications, the SR-Express spring cable reels are supplied with the cable already installed and connected to the slip rings so that it is ready for use, keeping downtime to a minimum.

For more information contact Donovan Marks, Powermite, +27 11 271 0000, donovan@powermite.co.za, www.powermite.co.za
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