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**Funding for growth in challenging markets...**

This year my youngest daughter will embark on a school trip to Spain, presumably with the goal of practicing her Spanish with native speakers, to prepare herself for her GCSE next summer. Personally, I’m a little dubious of the value of such a trip. I seem to remember my own school trip to sunny Le Touquet in France in preparation for my French O-level. Admittedly I’m going back a bit, but I don’t think much in the way language practice went on. The other thing I’m slightly dubious about with the Spanish trip is the cost. I’m pretty confident I could take away our family of four somewhere equally pleasant for a whole week for the same cost that the school is asking for one daughter for four days. Surely it should be a quarter of the price? In fact, even less, because shouldn’t economies of scale come into play?

The planning of how I might fund this trip got me thinking about funding more generally, particularly when there has been so much news of late about how venture capital companies are looking to invest in companies in key sectors – with UK companies coming out very well compared with other areas of Europe when it comes to the sums of money being invested. I could point to many companies that have benefitted enormously from venture capital, finding investment to fuel crucial periods of development and/or growth, and which have gone on to do great things. But equally, it has to be remembered that those venture capital companies are going to want a return on their investment. Indeed, we could say the same about any private investor in your company.

With that in mind, where else might you go to fund your company’s activities? Well, of course you could always simply take out a loan. The benefit is that a loan is quite flexible, and as long as you pay it back over the agreed term, the lender is – by and large – happy to let you do what you want with the money. But loans aren’t always the easiest things to get.

Another source of funding comes from the various Government grants, R&D credits and the like. These are most definitely worthwhile, and can provide significant sums of money for businesses. There can be some hoops to jump through to access those grants, but there are many companies out there who can help you with the process. All of these have value, and each will be more or less appropriate according to individual circumstances and requirements. But I was reminded recently of a fourth source of funding, and that’s from customers. You can do whatever you like with customers’ money. But loans aren’t always the easiest things to get.

All of which makes me wonder whether I might be able to crowd-fund my daughter’s trip to Spain, based on possible future translations services offered at attractive costs to early investors. If I could just steer her towards a language A-level in three years’ time...

Mark Simms
Editor
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Light bearings for innovation
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A third of SMEs are moving supplier base from EU to UK

From investment to turnover, recruitment to profits, forecasts are down for UK SME manufacturing bosses as they divert valuable resources to manage Brexit uncertainty. These are some of the findings of the latest national Manufacturing Barometer.

The latest quarterly insight into the SME manufacturing sector from SWMAS and partner Economic Growth Solutions, the UK SME Manufacturing Barometer, shows how the challenging economic and industrial climate is pushing UK manufacturers to carry significant risks as they move their supplier base out of the EU and invest precious cash reserves in stockpiling raw materials. Whilst actual and forecast performance both show a slight recovery from the previous quarter, the number of SME manufacturers reporting an increase in turnover, profits, staffing and investment in new machinery and premises are all down compared to the same period in 2017.

Current and forward projections are all down compared to the same period last year, being driven by a lack of clarity on the future. Taking a closer look at actual performance, 51% said turnover had risen in the last six months, 10% down on the previous year. Profits are also affected, though not as dramatically, with 42% reporting an increase compared to 45% the year before.

Investment in new machinery and premises is crucial for any manufacturing business in order to stay competitive, but this saw another steep decline with just 37% increasing spending in this area compared to the previous quarter. The SME Manufacturing Barometer also asked manufacturers what they are doing to secure and develop their supplier base. Specifically, they were asked whether, within the next 12 months, they intended to relocate any of their supplier base for raw materials and components, sub-assemblies and bought-in part-finished or finished goods. Over a quarter (27%) said they were considering relocating supply currently sourced in the EU to elsewhere — importantly, nearly 20% of this figure said they could instead seek these suppliers in the UK.

There is more opportunity for the UK too with 8% of UK SME manufacturers saying they could relocate suppliers currently based outside the EU to the UK. While 55% expect sales turnover to increase during the first half of 2019, that’s a full 17% down on the previous year. Fewer than half (45%) expect an increase in profits, down 14% year on year. Similarly, just 45% expect to invest in new machinery or premises, 11% down on the corresponding quarter in 2017, and even fewer, 43%, believe they will increase staff numbers in the next six months, down 7% on the previous year.

The SME Manufacturing Barometer also asks manufacturers to look ahead to the next six months. While 55% expect sales turnover to increase during the first half of 2019, that’s a full 17% down on the previous year. Fewer than half (45%) expect an increase in profits, down 14% year on year. Similarly, just 45% expect to invest in new machinery or premises, 11% down on the corresponding quarter in 2017, and even fewer, 43%, believe they will increase staff numbers in the next six months, down 7% on the previous year.

Simon Howes, CEO of Exelix Group (encompassing SWMAS), said: “Previous Manufacturing Barometers have demonstrated the characteristic determination and pragmatic approach shown by UK SME manufacturers in uncertain times, yet we must acknowledge that performance is down compared to this time last year and this is being driven by a lack of clarity on the future.”

Dean Barnes, Regional Director of Economic Growth Solutions, said: “Compared to last quarter’s forward projections we have seen a partial recovery in the number of manufacturers anticipating sales, profits, capital investment and recruitment to increase in the next six months. However, it is still a reduction across the board when compared to the same period last year.”

In this run up to Brexit, the Manufacturing Barometer also asked respondents what they are doing to secure and develop their supplier base. Specifically, they were asked whether, within the next 12 months, they intended to relocate any of their supplier base for raw materials and components, sub-assemblies and bought-in part-finished or finished goods. Over a quarter (27%) said they were considering relocating supply currently sourced in the EU to elsewhere — importantly, nearly 20% of this figure said they could instead seek these suppliers in the UK.

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The SME Manufacturing Barometer also explored manufacturers’ specific plans to stockpile – an intention that first came to light in the previous Manufacturing Barometer. Amidst the continued Brexit uncertainty, more than two thirds (69%) said they were using cash reserves to buy up and store raw materials and components. We must acknowledge that performance is down compared to this time last year, being driven by a lack of clarity on the future.

Barnes said: “Stockpiling creates its own issues, for example if the business can’t finance this activity or because suppliers’ stock levels are running low. While stockpiling is a popular strategy to try to head off Brexit uncertainty, it could be high-risk as it ties up a company’s cash reserves which are needed for running costs and to pay employees.”

Howes added: “As we head into the final weeks before the scheduled Brexit date UK SME manufacturers are doing what they can to adapt their businesses. Our research highlights that around half are holding back on investment and recruitment and struggling to increase sales and profits. Brexit is clearly amplifying the pressures manufacturers have to manage and whilst SMEs can be more agile they also have fewer resources to navigate and manage change.”

He concluded: “The latest Barometer shows the challenges of securing the supplier base and cost of addressing stock levels are diverting these limited resources from the sector. The UK’s SME manufacturers need support at this vital time to ensure any business casualties are minimised and that they have the resources to grasp any emerging opportunities.”
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**Industry News**

**ABB launches UK-wide VSD hire fleet**

Users of low voltage variable speed drives (VSD) can now keep processes running, test new applications or prove predicted energy savings before purchase, through a leasing program provided by the ABB authorised value provider network.

ABB has invested significantly in the rollout of a variable speed drive hire fleet across the UK and Ireland, with units extending from 3kW up to several megawatts. Hire drives can be delivered the same day, and installed and commissioned within a matter of hours by engineers from one of twelve ABB authorised value providers. With a fast response, 24 hours a day, all year round, no other drive hire scheme offers such wide geographical coverage across the UK and Ireland.


**Centre of excellence for robotic welding**

Yaskawa’s expansion and investment program continues apace with the opening of a new centre for robotic welding, milling and material handling applications in Newton Aycliffe, County Durham. The Yaskawa Northern Technology Centre represents a significant investment in excess of £250k and will enable Yaskawa to showcase solutions for welding, cutting and palletising applications.

The new centre will feature the latest robotic arc and spot welding applications using the full range of Yaskawa Motoman robots, positioners, power sources, weld controls and turnkey solution cell systems. It will enable Yaskawa’s customers to conduct customer demonstrations and trials on their products as well as customer product training for online and offline programming.

[www.yaskawa.co.uk](http://www.yaskawa.co.uk)

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**Overcoming the challenges of recruitment in engineering**

Engineering UK, an independent, not-for-profit organisation whose purpose is to promote the contribution that engineers and engineering make to the UK, have recently published Engineering UK: The state of engineering. Whilst 5.6 million people in the UK are employed in engineering (19% of the UK’s total workforce), Engineering UK reports that developing the pipeline to address the skills needs of the engineering sector remains a key challenge.

It estimates that 124,000 Level 3+ core engineering roles will be required to be filled every year for the next 10 years, against a backdrop of 46% of engineering employers reporting difficulty in recruiting. In a separate article published by Randstad, a recruitment agency, on a list of all engineering fields within the EU reporting difficulties in finding and recruiting the right calibre of staff, mechanical engineers are ranked seventh.

Reliance Precision is no stranger to this, admitting that with the specialist nature of its work, finding engineers with the appropriate skills and knowledge is not always easy. Engineering UK concludes its report by stating that to address the severe skills shortage in engineering, the industry must effectively harness the talent pool of young people.

Reliance has long recognised this and has been working for many years to support and engage with young people in the local community. A longstanding independent family-owned business, it prides itself on operating with the same family values and principles its founder, Max Selka, instilled when he established the business back in 1955. His vision then was to provide employees with an opportunity for personal growth and development alongside enjoyable, rewarding and interesting work.

**Company values and principles**

Still a prominent core value within the business today, the family includes within the company’s business plan a statement reinforcing the commitment to the company values and principles. Family member Charlotte Brandes, chair of the holding company, explains “It is important that the family continues to uphold the values that Dad instilled in Reliance. His personal values and ethics complemented his commercial vision, and he was also a great mentor.”

“We recognise we are a knowledge rich engineering business and as a family we feel a responsibility to nurture, feed and grow it,” she continues. “We believe in helping to develop the talent of the future through our established initiatives, the Engineering Apprenticeship Scheme being one example. This was introduced to provide young people with an opportunity to start a career in engineering, enabling them to gain their core foundation skills and then providing them with access to various roles throughout the business. Over 60 years later it’s still going strong, with over a quarter of our workforce apprentice trained.”

Reliance now typically takes on six apprentices a year and has achieved its goal of 10% of the workforce in apprenticeship, enabling the company to meet requirements for new skills, replace retirees and facilitate growth. Charlotte adds: “We continue to recognise the benefits the business can gain from bringing young people in, even on a short-term basis such as a student work experience placement. They come with enthusiasm and energy, and in an ever-changing and developing technology-led world, they bring new techniques and knowledge. In return we can offer them a taster of a commercial, working environment that often helps shape their future career path.”

Reliance has relationships with many universities, locally and nationally, offering students the opportunity of a placement during their degree course or gap year. These can prove very beneficial to students, allowing them to put their academic learning into practice in a real working environment. In fact in some instances, this can lead to them securing permanent employment at the end of their studies.

One such instance is a Cambridge undergraduate engineer who came to Reliance on a summer placement recently. Reliance technical director, Ian Laird explains: “He was literally thrown in at the deep end, working alongside the engineering team supporting them during our main holiday period. He returned to Reliance to do his second year placement, and with the knowledge he’d gained over the previous summer, was perfectly placed to pick up and run with some of the smaller projects with some guidance. We were incredibly impressed by his ability and what he brought to the business and consequently decided to sponsor his final year project. I am delighted that he has now taken up a permanent role at Reliance as a design engineer.”

Whilst many of the placement opportunities are focused around engineering students, Reliance are keen to ensure they don’t miss out on the non-engineering talent also.

The recent appointment of a graphic designer into the Marketing Team was the result of a successful placement from The University of Huddersfield. The student, who spent the third year of her BA in graphic design at Reliance, impressed the team with her design skills and the fresh approach she brought, and having kept in touch during the final year of her studies, was offered a full-time position.

Reliance has also worked hard over the years to develop strong links with local schools and colleges. Whilst this is predominantly to promote the Apprenticeship Training Scheme, the company is also keen to highlight the opportunity of undertaking a summer placement. These short placements provide young people with a taste of working life and are often instrumental in helping them make decisions about their future career path. One such example is 17 year old Sam Mannion, currently studying A levels at Huddersfield New College. Sam, unsure about what he wanted to do in the future, but recognising the benefits having some work experience under his belt would provide, contacted Reliance to see if they would let him spend his summer holidays working there. Over the course of the summer he worked in the sales and compliance teams, before spending his final two weeks documenting engineering components for a new tooling system in the operations team.

[www.reliance.co.uk](http://www.reliance.co.uk)
UK patent applications in Europe rise again

The volume of patent applications filed by UK businesses in Europe has risen again – further evidence of sustained investment in innovation activity. The Annual Report statistics released by the European Patent Office (EPO) show that patent applications originating in the UK rose by 7.8% to 5,736 in 2018; building on growth of 2.4% in 2017. The UK has also retained its 3% share of total European patent applications.

In fact, the increase in the volume of patent applications originating in the UK is above average compared to the overall increase in filings at the EPO, which rose by 4.6% to 174,317 in 2018. Of these, the largest number of applications originated in the US, Germany and Japan. The UK came 9th in the overall list of top-filing nations.

Rolls-Royce was the top UK filer; it filed some 352 patent applications at the EPO in 2018. Consumer goods company Unilever, was in second place, filing 289 patent applications. Other top UK filers included BT (166 patent applications), BAE Systems (162 patent applications) and GlaxoSmithKline (153 patent applications). The top-filing UK sectors were medical technology, computer technology and organic fine chemistry.

Karl Barnfather (pictured), chairman of European intellectual property firm, Withers and Rogers, said: “This is a strong step up for the UK and indicates that businesses are continuing to focus on innovation activity, despite the challenging trading conditions. Whilst the headline figures are positive, there is still room for improvement however.

Businesses in Germany are filing four times as many patent applications in Europe as businesses in the UK, and businesses in France are filing double.

“Underlying the EPO’s latest statistics, there is a significant disparity in UK investment in R&D, compared to other nations. In the UK, investment in R&D equates to 1.7% of GDP, significantly lower than in Germany, where it is 2.9% of GDP, the US where it is 2.7% of GDP and France where it is 2.2% of GDP. The UK Government’s commitment to raise R&D investment to 2.4% of GDP by 2027 is an attempt to close the gap, but the UK is playing catch up. Further investment in R&D is needed to place the UK at the forefront of the current technological revolution, which is bringing sweeping cross-industry changes.”

In the Spring Statement, Chancellor Philip Hammond is expected to reveal plans to invest £200 million in a series of cutting-edge scientific research programmes. He will also confirm plans to publish a long-term plan for research and innovation infrastructure is also due to be published in the autumn.

Growing adhesives firm opens new facility

Intertronics has opened a new state-of-the-art facility in Kidlington. The building provides increased warehouse space to enable next day delivery, an enhanced office area to house its growing team and a new Technology Centre to give customers greater access to Intertronics’ equipment and expertise.

The additional space will allow Intertronics to store a greater number of adhesives, coatings, sealants, and mixing, dispensing, and curing equipment. The improved warehouse capabilities will help Intertronics further develop its customer service by enabling next day delivery for a wider range of products. Managing director Peter Swanson says: “Choosing the right adhesive and dispensing equipment for an application is a challenging task and we are passionate about helping our customers make the right choice.

www.intertronics.co.uk
British made robots already helping UK manufacturers

British robotics manufacturer Automata says it has addressed the two primary issues that have limited uptake of robots in the UK, namely cost and ease of integration, with the launch of Eva – a robotic arm that is easy to use and costs just £4,990.

Off the back of $7.4m in funding, and following four years of development, Automata has announced that its Eva robot is now available for order in the UK and EU from the company’s website. Designed to be lightweight, user-friendly and accessible, while maintaining industrial quality performance, Eva can be ordered from the Automata website for just £4,990.

If that’s a price that seems too good to be true, it’s worth reviewing the design and development process that Automata has followed. Looking at the popular collaborative robots on the market, the company’s founders noted that these were all built around harmonic drive gearboxes. Each of these gearboxes was expensive in its own right; put six into the typical robot arm, and it’s easy to see how you can quickly get to a price of over £20k.

Proprietary gearing system
With accessibility at its core, Automata has designed a powertrain called AutomataDrive that includes a proprietary gearing system. Similar to a harmonic drive gearbox, the company says the AutomataDrive gives 80% of the performance for 20% of the cost. Thus the tailor made gearing system allows for the robot’s price point to be substantially reduced.

Addressing the issue of integration, Automata has complemented the robot hardware development with a new software program for Eva called Choreograph. This invites greater ease of integration, with its 3D programming capabilities, animation-inspired interface, and flexibility to run on any web-enabled device. Automata says set up time is substantially reduced from what would typically be days to just a few hours, serving as a further key point of differentiation from others in the space.

Together these twin developments open robotics up to manufacturers doing short production runs, in order to adapt to seasonal demands as well as offer high degrees of customisation. Co-founder Suryansh Chandra says: “We started Automata to democratise robotics and to ultimately allow anyone to seamlessly use a robot. We are extremely proud to offer Eva at the price point we do. People can visit the Automata website and buy a piece of industrial quality equipment on their credit card – it doesn’t get much more accessible than that.”

All of the controls are built into the base of the robot, so integration, deployment and programming do not require bulky external controls and user interfaces to be carried around. The browser-based programming software connects to Eva wirelessly – and being browser based it will run on any device, including laptops, tablets and smartphones. Two pushbutton switches are on the robot arm itself, providing a simple user interface to put the robot into teach mode. The arm can then be moved into its various operational positions to define its work path. And then, in the software, these points are dropped onto a timeline to create the operating profile. “The programming with the 3D model and the timeline maps to paradigms that people already understand,” says Chandra.

Volume production in the North East
To manufacture Eva, Automata has partnered with Tharsus, based in Newcastle. Eva robots are available to order now, on a 2-2.5 month lead time. But the robot is already proving itself in the field, with a number of UK manufacturers putting Eva through its paces in real world manufacturing environments. Among these is Qualitetch Components, a Cambridgeshire-based metal components manufacturer which uses photo chemical machining to produce burr-free and stress-free flat metal components.

“The key to our business is reactive flexibility,” says managing director Alex Craig. “We knew we needed automation to cope with growth, but we had been scared away from robotics due to their cost, lack of flexibility and difficulty of integration. But at £4,990, Eva was a no-brainer. It’s genuinely easy to use and has been working faultlessly for us. And installing the robot has enabled us to upskill our staff so that they can do jobs with added value rather than the repetitive manual tasks.”

Eva has also been trialled by Wokingham-based Nextgen Technology, which provides automated interoperability test services for silicon platforms, connected car, mobile and apps, and smart products that ensure seamless performance. Hardware products such as car infotainment systems have traditionally required manual interaction as part of the test process, but Nextgen Technology is finding that it can automate aspects of such testing with Eva, programming it to interact with the equipment just as real user would.

The company reports that the price made it a very attractive package, and that the specification and performance fitted its requirements.

www.automata.tech
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The Responsive People In Motion Control
Control system helps brewer increase production by 300%

The perfect beer is a harmonious blend of art and science. Automation can help by performing the measured and repetitive tasks while allowing brewers to focus on more creative, interesting and rewarding aspects. When Sadler’s Ales, a historic Black Country brewery, started to grow its business, it decided to adopt an automated process control solution to improve productivity and make the quality of its craft beers more consistent.

Sadler’s Ales, located near Stourbridge, in the Black Country has been crafting beers since 1900 and is currently run by Chris Sadler, a fifth-generation brewer. Popular brews in the company’s unique beer portfolio take reference from local subjects such as the Peaky Blinder range, which has proved an instant success nationwide.

The growing demand for Sadler’s beers led to the extension of the brewhouse, which contains all the equipment needed for the brewing process. This includes a mill to crush barley grains, a hot water tank, a mash tun to obtain wort and separate it from the mash, a copper to boil the wort while adding ingredients such as hops, a heat exchanger to rapidly cool the liquid, as well as several fermentation tanks and filter systems.

Chris Sadler, managing director at Sadler’s Brewery explained: “The new facilities should help us to quadruple production. Our goal is to produce up to 1,000 barrels a week.”

The overall objective was to create a higher capacity brewing process that could be monitored and controlled more easily by the existing staff. Sadler’s contacted local specialist Clarke Controls and Distribution to help achieve this objective. To address this issue, the team suggested an analysis of the plant to reverse engineer a new process control solution.

Clarke Controls and Distribution turned to its preferred automation vendor Mitsubishi Electric to help specify the ideal automation system components. First, Clarke Controls and Distribution engineers produced an accurate P&I diagram, which allowed Mitsubishi Electric automation engineers to determine the number of inputs, outputs, analogue signals, as well as the presence of critical electric motors (mainly pumps) where variable-speed control would be required.

The inverters and I/O units were then connected via a CC-Link industrial fieldbus network, to a Q series Mitsubishi Electric PLC, which is designed to be ideal for control applications. The various sensors and analogue components were connected to the control network using MELSEC ST Lite Remote I/O Nodes to include all the relevant process variables.

For Sadler’s to gain the greatest advantage from the new control system, Clarke Controls and Distribution and Mitsubishi Electric worked closely with the brewers to determine their needs and build a bespoke solution around these requirements. Stephen Thornton, key account manager at Mitsubishi Electric, explained: “To make sure we addressed all the challenges and requirements relevant for the brewery team, we asked the head brewer to give us a wish list on how he would like the equipment to operate. Based on this, we developed the current system.”

The various pumps, compressors and fans in the brewery were managed via the FR-F800 compact variable speed drives, or where appropriate the FR-F800 model that is specifically designed for maximum energy saving on pump and fan control applications controlled via MELSEC ST Lite Remote I/O Nodes to include all the relevant process variables.

The inverters and I/O units were then connected via a CC-Link industrial fieldbus network, to a Q series Mitsubishi Electric GOT2000 Human-Machine Interface (HMI) that displays live information and alarms. As a result, brewers can monitor the equipment, as well as adjust the processes.

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Craft beers become smart

Whilst the reverse engineering task required advanced skills and expertise to complete, the operator controls were more straightforward. The main requirement was to streamline brewing operations. The benefits from the automated control system were immediate, as production skyrocketed by 300% in less than a month, resulting in 650 new barrels available every week, corresponding to approximately 200,000 pints of beer.

Sam Pegg, production manager at Sadler’s Brewery, commented: “I have been brewing without the support of an automated process control system for many years, so initially I was a little apprehensive if I’m honest. I was, however, pleasantly surprised to learn how straightforward and easy the new solution was to use. The new control system has greatly improved my day-to-day activities from day one. Which means I can now focus on more interesting aspects, such as the development of new beers and recipes.”

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<table>
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<th>Power (kW)</th>
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<th>IE3 Efficiency</th>
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<td>89.4%</td>
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<td>92.6%</td>
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Drives eliminate burst pipes at pumping station

Scottish Water, a utility providing water and sewerage services across Scotland, suffered nine pipe bursts per year, on average, at its Castle Road pumping station. Each burst was estimated to cost £1,400 through leakage detection, repair materials and labour.

The bursts were caused by pumps being started direct-on-line (DOL). This crude start/stop control created pressure waves causing pipes to fracture and leak. For example, water may be moving at a flow rate of 10 metres per second. If the pump is then switched off, this moving water suddenly hits a dead end, surging back, shocking the network.

Maintaining supply pressure
EDC (Scotland) fitted two 5.5 kilowatt (kW) ABB water and wastewater drives, one for each of the two booster pumps. The drives provide a soft ramp up and a controlled slow down to maintain supply pressure in the pipe network. The project was completed in two stages to ensure no disruption to public water supplies.

Data loggers were used to gather information on pressure transients around the Castle Road site. Before the ABB drives were installed, the data revealed that on DOL starting, pressures were peaking at 140 metres head. Following installation of the drives, pressure data was again logged, revealing that starting and stopping the pumps using the VSDs reduced maximum pressures to 83 metres head.

Since the installation was commissioned in November 2016, the utility has had zero pipe bursts. The VSDs have also reduced the energy consumption of the pumps, saving an additional £200 per year. The return on the £5,500 investment in drives was achieved in five-and-a-half months.
A need to produce potable water for the residents of an island in the United Arab Emirates resulted in a variable frequency drive being used as part of the reverse osmosis seawater desalination system.

Island residents rely on drives for clean water

Reverse osmosis seawater desalination system was needed at Al Fattan Island, a private development in the UAE, where no mains water was available. Using seawater and purifying it was the only option. GI.Tech FZE, Invertek’s sales distributor in the region, worked with Gulf Water Treatment, a designer and manufacturer of desalination systems.

Pumps are used in the desalination process to maintain a minimum 1,200psi high-pressure water on a semipermeable membrane in the reverse osmosis process to remove particles and bacteria from the water. Three pumps are used in the process, pumping 20,000 gallons of water a day. An Invertek Optidrive Eco IP55 was installed and commissioned as part of the solution controlling the 37kW pumps.

“The desalination plant at Al Fattan Island is the only source of clean potable water,” said Soju Sonny Mathew of GI.Tech FZE. “So, it is essential for the system to have capable and reliable VFDs to control the high-pressure water pumps. The water is pressurised at 70 bar through the membrane which overcomes osmotic pressure, a colligative property. This property forms part of the desalination process, removing particles and bacteria from the water.”

“The Optidrive Eco, along with its Optiflow technology, ensures the pumps are performing at optimum levels. This ensures improved efficiency and reduces lifetime costs, as a result, less maintenance and downtime of the pumps.”

Harikrishnan K of Gulf Water Treatment, which was established in 1992 and has developed into a leading technology company with services and solutions for all aspects of water, from chemical treatment to hazardous industrial effluent, as well as seawater desalination, said Optidrive Eco was a perfect solution. “Our systems have to ensure accurate pressure as part of the reverse osmosis process. And so, to be able to accurately and efficiently control the pumps was crucial. The Optidrive Eco was very easy to install and commission, and we know long-term it will ensure maximum efficiency for the desalination plant.”

The Optidrive Eco VFD maximises energy savings through constant monitoring of the pumps, optimising the output to match the required flow. Its advanced sleep and wake functions also provide maximum energy efficiencies by switching off the pump when it’s not required. The Eco can also detect pump blockages and can clean them automatically, thus reducing maintenance requirements.

With Invertek’s built-in PLC function, the VFD can also be quickly and easily programmed and commissioned. Optidrive Eco can control AC Induction (IM) motors, AC Permanent Magnet (PM) motors, Brushless DC (BLDC) motors and Synchronous Reluctance (SynRM) motors. The range covers 200-600v single and three phase input and 0.75kW to 250kW, 1HP to 350HP. It comes in three enclosure options – IP20, IP55 and IP66 – and seven frame sizes, with OLED displays on IP55 and IP66 models.

Speaking at H2O Accadueo in Bologna, Italy, about the benefits of VFDs within the water treatment sector, Tony Cox, sales manager at Invertek Drives, said: “The water technologies and treatment distribution sectors can achieve significant savings and efficiencies with the introduction of Invertek’s innovative VFD technology. It’s not only about making savings in the use of water through intelligent control, but the reduction in costs associated with downtime or maintenance as a direct result.”

Innovations such as Invertek’s unique Optiflow system provides multiple pump control in addition to efficiencies that help save energy, time and money. Other benefits include dry run protection and burst pipe detection.

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An innovative hybrid electromechanical and pneumatic robotic arm, delivered as a preassembled unit, is at the heart of a new automated milking machine which can increase efficiency and reliability, with smooth movement and high performance.

With the cow as its focal point, Lely develops premium robotics and data systems that increase animal welfare, flexibility and production on the dairy farm. It brought its first automated milking machine to market in 1992, and has continued to improve on that initial design over the past 25 years, culminating in the development of the Astronaut A5 milking machine in 2018. To reap the greatest benefits from technologies which Lely acknowledges were developing rapidly, the company recognised the need to work with a technology partner in the design of the A5 – and it found that partner in Festo.

Lely and Festo had worked together on the previous generations of the Astronaut, the A3 and A4, in a relationship that has seen Festo move from simply a component supplier to a strategic business partner. The culmination of this partnership is the robot arm for the A5, built around a hybrid design of electromechanical and pneumatic technologies, and supplied to Lely as pre-assembled unit, ready for installation into the A5. As well as the required functionality, the design also had to address the challenging environment, and ensure reliability despite high levels of dirt, ammonia and humidity.

The hybrid arm in the Astronaut A5 is set to feed 7000 cows a day, and offers increased efficiency and reliability, with smooth movement and high performance.

Core areas of expertise
The mechatronics solution developed by Lely and Festo doesn’t work without software, with the software team from Festo’s systems solutions division in Esslingen, Germany, developing the motion software for the overall Astronaut system. “We take that we can concentrate on our core areas of expertise for the development of the overall Astronaut system,” reports Martijn Boelens, senior systems engineer at Lely.

The application software team creates software modules that aren’t only suitable for fulfilling the specific requirements of customer projects, but can also be used again for other projects. Application software is implemented using function blocks, libraries or sample programs. The focus is on the Codesys language specified by IEC61131-3, and Festo control systems. The team simulates the software functions with Matlab Simulink.

By integrating the robot arm, Festo’s electromechanical drives and controlling format electromagnetic compatibility and reduces installation effort and space requirements. Valve terminals type VTUB-12 valve terminals control the process valves for the milking process.

Compared to the servo-pneumatic and hybrid predecessor technologies used in Astronaut A3 and A4, the electrically actuated powered robot arm has clear advantages: its motion is gentler, and it’s more energy-efficient than the previous models. “This time to discovery is much shorter,” adds Jan Bredau, vice president for solutions at Festo. The experience gained from the milking robot’s development of the Astronaut A5 is being integrated into other software libraries. “The benefit for our customer is that motion sequences can be easily configured via an intuitive customer interface without any programming knowledge,” says Bredau.

Where the Astronaut A5 is deployed on a farm, each cow wears a small transmitter chip on which data such as size, weight, recommended feed quantity and last milking time are saved. When a cow enters the milking stanchion, it is identified and the management software decides if the cow is ready to be milked. If it is, then the robot system is activated. By offering availability 24 hours a day, seven days a week, the machine enables the cows to be milked whenever they are ready, thus making life much more comfortable for the animal. The automated system also lifts a heavy burden of manual labour from the farm, helping to make life easier for farmers.

From its factory in the Netherlands, Lely manufactures some 2800 milking machines each year - all built to company standards to systematise a diverse range of high-quality milking units to the dairy industry will be fully robotic.

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Found in 1983, Brilliant Stages is a world leader in the design, construction and integration of stage sets, complex constructions and motion control systems. With this in mind, when Brilliant Stages recently required a high-performance, robust turntable (TT) bearing for an exciting new project, it turned to RA Rodriguez. This essential component would prove pivotal in bringing the set to life for what promised to be a technically challenging series of concerts performed by Robbie Williams.

As part of the show, Robbie would appear sitting in a huge boxing glove at the end of an articulated arm. The Rodriguez TT bearing was required for the elbow joint, where it would provide the rotate movement. Clearly, first-class performance attributes, including reliability and safety, were paramount.

Fast turnaround
Dave Young, northern area and slewing bearings product manager, says: “Brilliant Stages is a fast-paced business which likes the fact that we offer Rodriguez TT bearings ex-stock on short lead times. Having developed our relationship, we now have a way of working where Brilliant Stages will call and tell us about the job and the loads involved. We will then provide a selection of ex-stock options, from which they will see what works best and design the mechanism around it. At Rodriguez we work in partnership with our customers to ensure we respond in the way that best suits the business model.”

Based on performance, quality, availability and competitive price, Brilliant Stages selected an 844mm KDM four-point-contact bearing (external geared, with mating pinion drive). Rodriguez KDM/KDMH bearings, which feature hardened raceways, have met requirements in various turntable applications for many years. These four-point-contact bearings are robust and proven in the toughest applications, absorbing both axial and radial loads, as well as tilting moments, making it ideal for the Robbie Williams application.

The versatility of Rodriguez TT bearings was further tested with the next request from Brilliant Stages, which needed a solution to rotate a large scissor lift that would operate throughout a breath-taking and ambitious stage set by Helene Fischer. In this instance, a larger bearing was required, with Brilliant Stages opting for an 1155mm KDMH four-point-contact bearing, again external geared with mating pinion drive, and again supplied ex-stock.

Flexible options
KDM/KDMH TT bearings can be supplied ungeared or with gear teeth as an integral part of either the inner or outer ring. Furthermore, the bearings can be produced featuring limited clearance, with a centring ring or as heat-resistant bearings, in line with specific customer requirements. An NBR nitrile rubber seal is included on each side of Rodriguez TT bearings.

The quickest turnaround to date was reserved for the TT bearing needed for a stage set used by Beyoncé and Jay-Z on their recent tour. “I was on a train when Brilliant Stages called; it was a Thursday before a bank holiday weekend and the bearing was required for the following week as 14 days later the completed system had to be ready for the first concert,” says Young.

At 414mm, the selected Rodriguez KDLA TT bearing (external geared, with pinion) is smaller than those previously supplied, but the application was no less challenging. The bearing was used as part of a mechanism that raised, lowered and rotated Beyoncé high above the stage while she sat in an armchair.

www.rarodriguez.co.uk

Singing the praises of turntable bearings

Wakefield-based Brilliant Stages is leveraging the benefits of turntable bearings for stage sets used by some of the globe’s biggest-selling pop artists. Robbie Williams, Beyoncé and Jay-Z, and Helene Fischer – a successful singer in Germany who has sold more than 15 million albums worldwide – are all putting this innovative bearing technology to the test as part of extraordinary and elaborate shows.
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Passing the radiated

James Scanlon explains how you can eliminate complex EMI mitigation techniques for compact, cost-effective isolated designs.

Isolation is required for a variety of reasons in electronic systems. It is needed to protect people and equipment from high voltages, or to simply remove unwanted ground loops on a PCB. It’s an essential design element in a wide variety of applications, including factory and industrial automation, medical equipment, communications, and consumer products.

While critically necessary, isolation design is also extremely complex. When controlled power and data signals are passed across the isolation barrier, it creates electromagnetic interference (EMI). These radiated emissions (RE) can negatively affect the performance of other electronic systems and networks.

An important step in circuit design with isolation is to transfer power across the isolation barrier and mitigate the resulting RE. Though conventional approaches can be effective, they often come with trade-offs. They may include the use of discrete circuitry and transformers for the transfer of power. This is a bulky, time-consuming approach that takes up valuable PCB space—all of which leads to higher costs.

More cost-effective solutions integrate the transformer and required circuitry into smaller form factors, such as chip packages. While this saves board space and reduces design complexity and cost, it results in a smaller transformer with fewer windings and the need for higher switching frequencies (up to 200MHz) to efficiently transfer the required power to the secondary side. At these higher frequencies, parasitic common-mode (CM) currents may capacitively couple from the primary side to the secondary side through the windings of the transformer.

Due to the nature of the isolation barrier, there is no physical path to return these CM currents to the primary side. The isolation barrier forms a dipole that radiates energy as the CM current and returns it to the primary side. This presents another significant consideration: regulatory compliance.

**EMC requirements**

Before a product is marketed, it must conform to EMC regulations. The integration of transformers and required circuitry into smaller packages results in EMI, which requires complex and costly RE mitigation techniques in order to meet electromagnetic-compatibility (EMC) regulations.

Radiated emissions must be below a specified level based on the intended use environment and application. EMC testing and certification has therefore become an integral part of bringing a product to market. Products sold in the EU require a CE mark, while those sold in the US require an FCC classification. Attaining these certifications requires a suite of EMC tests to be performed on the system. In industrial, medical, communication, and consumer environments radiated emissions typically have to comply with CISPR 11/EN 55011, CISPR 22/EN 55022, or FCC Part 15.

CISPR 11/EN 55011 applies to equipment designed and placed on the market for electromagnetic interference (EMI) purposes. Within the standard, equipment may be categorised into one of two groups. Group 2 is for all ISM RF equipment in which radio frequency energy is intentionally generated and used locally. Group 1 contains all equipment in the scope of the standard that is not classified as Group 2 equipment.

CISPR 22/EN 55022 applies to information technology equipment (ITE) whose primary function is a combination of entry, storage, display, retrieval, transmission, processing, switching, or control of data and telecommunications messages, and which may be equipped with one or more terminal ports typically operated for information transfer.

Equipment is classified further within each of these standards, with each class governed by a separate set of emissions limits: Class A—equipment used in industrial applications and nonresidential areas; and Class B—equipment used in residential environments. Because Class B limits cover residential (or light industrial) environments where products are more likely to be within close proximity to one another, they are more stringent (as much as 10dB lower than Class A) so as not to cause interference issues.

Consider EMC from the outset

It has been reported that 50% of products fail EMC testing the first time. This may be a result of lack of knowledge and failure to apply EMC design techniques early in the product design phase. Ignoring EMC until the functional design is completed often creates a time-consuming and costly challenge. In addition, techniques available to solve EMC issues decrease as you move further along the product development path, as aspects of the product cannot be changed without schedule overruns and increased costs.

Designing for EMC at the start of your project is critical to minimising design time and project cost. The choice and placement of components are also important. Selecting and designing in devices that already meet industry standards can increase the ability to meet compliance.

Compared to conventional approaches that use discrete transformers, the integration of a transformer and circuitry into a chip scale package will lead to greatly improved PCB space saving due to the reduction in the number of components, but may introduce higher radiated emissions. Radiated emissions mitigation techniques may negate the savings of the integrated transformer and cost due to added PCB design complexity or additional components. For example, a common way to mitigate radiated emissions at the PCB level is to create a low impedance path from the secondary to the primary side for CM currents and therefore reduce the level of RE. This...
emissions test

Use of ferrite bead to reduce effective dipole

can be achieved by using a stitching capacitor between the primary and the secondary side. The stitching capacitor can be either a discrete or an embedded interlayer capacitor.

A discrete capacitor is the least complex solution and may be a leaded or surface-mount component. It also has the benefit of being suitable for a two-layer PCB, but discrete capacitors are expensive and bulky, and they take up valuable PCB real estate, especially along the isolation barrier where multiple components may be stacked.

Another less than ideal solution is using an embedded stitching capacitor, which is formed when two planes in a PCB overlap. This type of capacitor has some very useful properties in that the inductance of the parallel plate capacitor is extremely low and is therefore effective over a larger frequency range. It will improve emissions performance, but it adds design complexity and cost due to customising the layer thickness to get the correct capacitance and the requirement of four or more layers in the PCB. The spacing between internal overlapping layers must also meet minimum specifications for distance through the insulation as defined by the relevant isolation standard.

A stitching capacitor also allows AC leakage and transients to couple across the barrier from one ground plane to the other. Although the stitching capacitance is generally small, high voltage, high speed transients can inject significant currents across the barrier through this capacitance. This must also be taken into account if the application is subjected to harsh electromagnetic transients, such as electrostatic discharge, electrical fast transients, and surge.

The use of stitching capacitance, whether a discrete or embedded capacitor, is not an ideal mitigation technique. It will aid in reducing radiated emissions but at the expense of additional components, complex PCB layout, and increased transient susceptibility. Ideal mitigation techniques would not require the need for a stitching capacitance and hence improve costs and reduce PCB design complexity.

Eliminate the requirement

So is it possible to eliminate the need for complex mitigation techniques? Ideally, an integrated isolated power component should contain measures to reduce the emissions within the chip and guarantee passing the system-level emissions without having to create intricate extra external measures. This will allow passing stringent emissions tests without multiple board spins just by placing the components on a simple two-layer board.

Analog Devices’ next-generation isoPower family incorporates design techniques that avoid the generation of high level radiated emissions, even on a two-layer board with no stitching capacitance. The ADuM5020 and ADuM5028 can provide 500mW and 330mW of power, respectively, across the isolation barrier while meeting CISPR 22/EN 55022 Class B limits with substantial margin.

The ADuM5020 comes in a 16-lead wide body SOIC package, while the smallest package option is the 8-lead SOIC for the ADuM5028. The ADuM5020/ADuM5028 offers both 3V and 5V power supply options and an isolation rating of 3 V rms. The ADuM5020/ADuM5028 offers 5kV rms and meets the same power and emissions levels as the ADuM5020/ADuM5028.

In order to reduce radiated emissions, the ADuM5020/ADuM5028 has excellent coil symmetry and coil driver circuits that help minimize the transfer of CM currents across the barrier. Spread spectrum techniques are also employed to reduce noise concentration at a particular frequency and spread the radiated emission energy over a wider band of frequencies. The use of inexpensive ferrite beads on the secondary side further reduces emissions. These techniques improve the levels of both the peak and quasi-peak measurements during RE compliance testing.

The ADuM5020/ADuM5028 offers a drop-in DC-to-DC power solution. With a small footprint and excellent RC performance, it is a cost-effective, low complexity solution that will aid in meeting EMC regulations if designed into the product at the start of the design cycle.

Conclusions

Designing power for isolation can be one of the most challenging aspects of a design process. Creating a solution requires balancing design demands with the need for regulatory compliance in a number of different global regions. The result can often mean compromises that negatively affect size, weight, and performance, or that threaten the ability to meet EMC compliance.

In order to achieve EMC success, incorporate devices that are proven to meet industry standards early in the design phase. EMC should be part of the design process and not an afterthought. The use of mitigation techniques such as stitching capacitance reduce the transient immunity of the electronic system and increase cost and design complexity. Analog Devices next-generation isoPower family offers radiated emissions mitigation techniques that remove the need for a stitching capacitor while still meeting EN 55022/CISPR 22 Class B.

The ADuM5020/ADuM5028 incorporates spread spectrum techniques that reduce the level of power at any one frequency. Excellent design, transformer coil symmetry, and the use of two small inexpensive ferrites reduce the flow of CM current across the isolation barrier and into the secondary ground plane. The ADuM5020/ADuM5028 reduce costs by meeting CISPR 22/EN 55022 Class B with significant margin on a two-layer PCB without the need for expensive PCB level RE mitigation techniques.

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James Scanlon is an applications engineer at Analog Devices within the Isolation Technology Group
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IEC 600034-23 – how will it impact

Dr Martin Killeen of the AEMT (Association of Electrical and Mechanical Trades) outlines the requirements of the international repair, overhaul and reclamation of rotating equipment standard, and highlights how it impacts on both the repair provider and the end user.

The new international standard IEC 600034-23, which was published in Autumn 2018, is the first to include the requirements of the circular economy, a very important concept that aims to reduce the consumption of resources. Until this point, eco-design, in terms of rotating equipment, had mainly focused on energy efficiency but now attention has turned to reducing material consumption as well.

The new standard establishes the benchmarks for repairing rotating equipment, maintaining efficiency levels, high standards of quality control and improving efficiency in associated pieces of equipment. The standard does not supersede those pertaining to specialist equipment, such as ATEX, nuclear, aviation, hydrogen cooled and traction, but it does include reference to them and several other standards.

By complying with the new standard, maintenance and repair facilities can prove their quality of workmanship and performance, as well as promoting their commitment to reducing waste and recycling resources. By following the international guidelines, the repaired equipment can be badged with an indicative statement. And by advertising compliance with this standard, companies are promoting their eco credentials, not only in the repair procedures but also in the way that the equipment is tested and proven. Demonstrating procedures that improve efficiency and reduce waste can also act as an effective commercial sales tool as well.

The long-term aim of the standard is to maintain or improve the efficiency of equipment. It will allow upgrades to be implemented, if they are allowed by the original equipment manufacturer (OEM). This means that the repair workshop needs to be well equipped, with good quality control procedures and staffed by suitably competent employees that are capable of delivering high quality repairs.

This brings us back to the circular economy, which aims to minimise waste through reusing, repairing, refurbishing and recycling existing materials and products. The repair of electrical machines fits in exactly to this concept and by keeping energy efficient equipment operational, we are minimising the use of additional resources. For some older machines, it may be possible to upgrade their efficiency at the same time as completing a repair. Using modern materials in the rewind and upgrading to a higher-grade insulation – for example grade B to F, which is much thinner than the legacy component – it is possible to increase the copper content of the windings, making it more efficient by reducing the copper losses and longevity of the motor.

At the same time, any materials that are removed during the repair process, such as old windings and bearings, can also be recycled, which again minimises the net increase in material consumption. Furthermore, the efficiency analysis will also consider both the repair and the replace options, to ensure that the customer achieves the most cost-effective outcome.

Replacing motor bearings

To illustrate this further the standard uses the example of a typical 110kW motor that is need of repair. Approximately 50% of motor failures are attributed to bearings being at fault. Replacing the bearings will double the life of the machine and use 99% of the original machine because bearings are regarded as high quality, green scrap. In fact, within a typical 110kW motor, only 0.9% of the materials used to make it are recyclable. The steel laminations, iron frame, copper windings, aluminium rotor and the bearings can all be reused – the only waste products are the insulation, varnish and paint.

If the repair involved the machine being rewound, then 90.5% of the materials would be reused. However, the copper and steel being replaced are both high quality, green scrap, so again only 0.9% of the materials cannot be recycled or reused during the repair.

The new standard sets out good practice guidelines for various procedures, including the removal of windings using a burn-out oven. The stated maximum temperature for the oven is 370°C (700°F) to prevent damage to the steel laminations. However, if e5 or e6 steel has been identified, then the temperature can be increased to 400°C (750°F).

Further guidance is provided for the orientation of the motor, which should be mounted horizontally in the oven to prevent the chimney effect, which can increase heat above the maximum level. In addition, the temperature profile and the maximum temperature of the oven need to be recorded as part of the documentation for the job. Once the old windings have been removed, the repairer can install the replacements; if these have been brought in from a third party, it is important to check the specifications to ensure compliance with IEC 600034-23. The insulation grade should match the original or provide an improvement. This is increasingly important for equipment that is supplied with a variable speed drive or frequency inverter, which can cause voltage spikes that would otherwise not be present.

At the same time, the varnish or resin used to encapsulate the windings should be applied as per the manufacturer’s recommendations for curing temperatures. Improvements in resin and insulation material properties will only be realised if the guidelines from the respective manufacturers are followed.

Repairing and rebuilding

In some cases, it may be necessary to rebuild a shaft, but it is important to carry out non-destructive testing (NDT) using penetrant dye or magnetic particle inspection (MPI) before any remedial work is completed. If any cracks are found, they need to be removed before any rebuilding of the shaft is started. Shafts can be repaired by sleeving, spiral welding and metal spraying. If metal spraying, then a bond test of 40MPa is recommended. For some specialist equipment, such as Ex motors, bond testing is a requirement that is outlined in the standard specific to the equipment in question. It should be noted that metal spraying is not recommended for peripheral speeds exceeding 90m/s.

Repairs can also be made to bearing seats, rebuilding them by metal spraying or welding using MIG, TIG, Sub-arc or hot wire processes and the seats should be rebuilt to the manufacturer’s tolerances. At the same time, any replaced shafts should have the same magnetic and mechanical properties as the original, but peening the shafts to improve the fit is not recommended.

Replacement bearings and any grease should be in accordance with the manufacturer’s recommendations.

As the concept of the circular economy gains greater popularity, so companies that embrace standards such as IEC 600034-23 will be able to promote their active participation.
Your business?

The majority of rotating equipment is ultimately powered by fossil fuels and global consumption is continuing to increase. The more industrialised countries continue to use large amounts of energy, while the developing countries are rapidly catching up.

Based on the known reserves, we have 114 years’ worth of coal remaining, 52.8 years of natural gas and 50.7 years of oil. These figures will continue to change as we discover new reserves, but they are also affected by the increasing consumption figures.

However, locating new reserves and not addressing the key issue, which is the increasing rate of consumption. With fossil fuels being used in so many aspects of our lives, a long-term strategy is required to tackle this issue and the latest repair standard for rotating equipment is another step in the right direction.

These have potential implications for rolling resistance and can impact on efficiency figures. If insulated bearings are installed, they should be tested and the results recorded as part of the repair file.

Testing procedures
Although the new standard does cover test procedures, such as insulation resistance, surge comparison, voltage withstand, phase balance, continuity, brush neutrality, and commutator concentricity the details are referenced in their respective standards. These have remained relatively unchanged but repairers should be mindful to cross reference between IEC 60034-23 and the testing standards to ensure full compliance. Test meters and equipment should be calibrated and certified on a regular basis.

For electric motors, there is a requirement to carry out a no load test and a locked rotor test to establish vibration levels and calculate essential data such as the power factor and starting torque. Once again, as with so many parts of this standard the details are referenced to another standard, in this case IEC 60034-1.

In order to achieve compliance with the new standard, most repair workshops will continue with their existing good practice, having invested in suitable facilities and equipment while keeping staff up to date on training. The continued use of a suitable quality control system and repair labels will be maintained, ensuring that any audit of the repair process will result in a glowing report.

As the concept of the circular economy gains greater popularity, so companies that embrace standards such as IEC 60034-23 will be able to promote their active participation. This has the potential to highlight not only the professionalism of the company for repairing rotating equipment, but also demonstrate its commitment to reducing waste and minimising the consumption of resources.

www.theaemt.com
Gantry system improves quality of blacking process

A low maintenance gantry system has improved consistency and quality of a multi-station chemical finishing dipping plant

Linear motion expert HepcoMotion has recently upgraded its core blacking process system with the use of its own HDS2 rack driven gantry system to dip its slides, rings and track system into a multi-station chemical finishing dipping plant. The blacking process changes the colour of metal items to black, which improves the visual appearance, providing uniformity and consistency. The blacking process is a key part of Hepco’s manufacturing process with all products apart from stainless steel or special orders being blackened.

The dipping plant spans across 16m with seven separate dipping tanks (four tanks with chemicals and three clean water rinse tanks). The slides are held in a dipping module which can accommodate up to 16x4.32m lengths of slide at one time. The dipping module is then picked up by the gantry, moved forwards and then lowered into each of the seven tanks in turn. The gantry is constructed from HepcoMotion’s HDS2 heavy duty linear guides which has a wide range of V bearings and linear components to handle the heaviest loads. Hepco’s HDS2 gantry is ideally suited to this application as it is a high capacity system with low maintenance features.

The X-axis comprises two HB25 aluminium beams at 16.16m long, each fitted with two single edge HD slides. V slides are used on one beam and flat tracks on the other beam, providing allowances for the variation in parallelism between the two beams. Parallelism of ±2.5mm ensures the set up time needed to accurately assemble the system is reduced. Moreover, the tolerance of misalignment ensures the system is able to cope with the offset loads. The slides are rack cut and fitted with MOD three rack option. Six bearing carriages are used to accommodate the higher load.

Moving at a nominal speed of 0.5m/s, the X-axis has been optimised to move at a steady and smooth speed to ensure the slides remain securely on the dipping module. The slides cannot be fastened to the module as this would cause non-blackened areas on the slide. HDS2 can move up to 4m/s but this speed is not required for this application.

With a payload of 700kg, HDS2 ESR slides (HS24ESRV) are used on the Z-axis, offering up to four times the load capacity of the standard HDS2 slide. ESR slides are precision machined from high quality steel and are surface hardened to provide excellent load capacity and wear resistance. Supplied with a MOD 5 rack, these slides have been designed to mount directly to Hepco’s range of HDS2 components, saving on valuable assembly time. The slides are mounted to a beam, housing the motors, gearboxes and drive shafts to provide the vertical and horizontal movement.

The Z-axis moves at 0.5 m/s with a stroke length of 1.5m to raise and lower the slides into the dipping tank. Two heads are utilised to provide stability manoeuvring the 4m lengths; a challenging shape and size. The time spent in the tank varies from 30 seconds to 240 seconds, depending on the individual tank. Between each chemical tank, the slides are submerged in a clear water rinse tank to rinse the slides off and to prevent cross contamination of the chemicals in the process.

Repeatable movement

As the dipping module is moved from one tank to another, a smooth and repeatable movement is paramount. The system aligns the dipping module to repeatable positions along the 16m gantry to ±0.25mm, ensuring the slides are accurately positioned above the corresponding tanks to be lowered into. The gantry is programmed to move from the start position, to each of the seven tanks at set intervals, and then accurately back to the start position. This is possible due to the drivers and gearboxes selected, as well as the rigidity and accuracy of Hepco’s HDS2.

Being a high duty application covering long distances with heavy loads, the need to be low maintenance was a key driver. Any machine downtime with the blacking process has the potential to impact on orders and delivery times, so it was key for the system to deliver continuous operation, without the need to be stopped regularly for routine maintenance such as re-lubrication.

Low maintenance cap wipers are used, providing effective sealing and protection, whilst also wiping debris from the guide profile. The gantry also has an automatic lubrication system which delivers lubricant directly to the contact surfaces between the slide and the V bearings, ensuring that lubrication is constantly supplied to the slide. The system does not need to be stopped at regular intervals for re-lubrication, reducing downtime and increasing machine efficiency.

When maintenance is required, the process is simple and does not impinge too much on production time. All bearings used in Hepco’s HDS2 gantry carriages are the removable type and can be dismounted from the carriage without the need to remove the carriage from the end of the axis. This means the whole process is very quick and can be achieved with minimal downtime. Under lubricated conditions, there is also no need to change the guide.

V guide technology

Hepco’s HDS2 gantry system is based on its precision V guide technology. Hepco’s V guide system has a unique wiping action that expels debris, making it perform particularly well in harsh, industrial environments, such as Hepco’s manufacturing headquarters. The outer diameter of the bearing travels at a faster speed than the inner diameter. The difference in speed causes particles nearer the centre to move outwards to the periphery, and to be expelled. Due to the geometry of the slide and bearing interface, debris is expelled to the outer diameter of the bearing in a spiral motion, away from the running surface.

The previous linear system used by HepcoMotion worked by sending the slides on conveyors, with the chemicals sprayed onto the slides as they passed through different spray booths. The biggest problem with this system was the quality and inconsistency, as the surfaces of the finished slides were not consistently covered in the black colour. Moreover, a minimum of three people were required to operate the old system, whereas the new automated system requires only one person, resulting in a significant reduction in labour. Processing 0.9m of narrow section slide every minute, the new gantry system has improved both the quality and consistency of the finished product as well as reducing the number of operators needed.

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Torque motors offered with watertight cooling jacket

TMB+ torque motors have the new option of a cooling jacket that provides alternative mounting options and other advantages to users in the machine tool industry, while also opening the door to aerospace and semiconductor applications.

For more than a decade, Heidenhain group member ETEL has been producing top quality, frameless torque motors with high continuous flux density in the magnetic gap for powering thousands of machine tools around the world. An increasing number of manufacturers are keen to use direct-drive torque motors to control axis motions precisely, as their advantages over conventional drives with gearbox or toothed belt transmissions are well known.

What may not be so obvious is that effective heat dissipation by liquid cooling increases torque motor performance substantially and can even double it. Until now, cooling management was mainly the responsibility of the customer, who had to design a machine structure precisely to accommodate the motor and to ensure water tightness, especially against ingress of coolant flowing close to it.

With the introduction of the cooling jacket option on all low-cogging ETEL TMB+ motors, which in any case are thermally efficient, Heidenhain is providing a solution that removes the burden of both cooling and water tightness of the unit from the machine designer. At the same time, it leaves room for different machine layouts and material selections, which can lead to significant cost reductions. Design flexibility is assisted further by the jacket being available with either radial or axial water inlet/outlet.

ETEL claims to be unique on the market in that more than 60 of its motor sizes equipped with a cooling jacket are available. Optimised for ease of mounting, the robust jacket consists of a precisely mounted metal enclosure that ensures water tightness and superior motor performance to conventional mounting relying on open cooling.

Condition monitoring for more applications

SKF has further expanded its offering in condition monitoring with a compact, competitively priced system that is flexible enough to be used across a broad spectrum of applications and industries. The SKF Multilog IMx-16Plus will help more users of rotating equipment to reduce unplanned machine downtime, improve asset availability and optimise machinery operation.

Condition monitoring has historically been restricted to the most critical assets. However, the SKF Multilog IMx-16Plus, which is based on the proven SKF Multilog IMx-8, allows condition-based maintenance to be integrated in applications that would previously have been too costly to consider.

With the ability to monitor everything from a single machine to an entire plant from a central location, the SKF Multilog IMx-16Plus integrates seamlessly with other devices (such as the IMx-8) to allow more extensive deployment.

The system receives condition monitoring signals – from vibration or temperature sensors, for instance – to offer early fault detection in industries including wind energy, marine, processing and machine tools. It monitors all types of rotating assets, from pumps and motors to fans and compressors.

SKF Multilog IMx-16Plus features integrated connectivity via mobile data (GPRS and LTE) or Ethernet (RJ45 or Wi-Fi). As well as having 16 analogue inputs – typically for vibration sensors – it also has four digital channels for speed sensor inputs.

Servos as small as a pack of cards

A new range of miniature servo drives, no bigger than a pack of cards, has been launched in the UK by Motor Technology. Manufactured by Italian firm Axor Industries, the new Mack Nano drives have been designed as an ultra compact, low-cost alternative to AC, DC and stepper applications that would benefit from the higher performance of a servo system without the usual hike in cost.

The new drive modules pack in functions such as control for brushless and DC servo motors, stepper motors and sensorless motors. They include control modes such as analogue and digital speed and torque demand, clock and direction signals, and various serial communication and fieldbus options.

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Getting a grip in the automotive industry

Additively manufactured gripper fingers have opened up new possibilities for a supplier of robotic handling systems within the automotive industry, with reduced design time, increased speed of delivery of the grippers and a lower item price.

With around 300 employees, German company ROS develops and manufactures highly precise tools and plants at its Coburg and Ummerstadt plants for the production of functional and visible parts for the automotive industry. For example, ROS provides a comprehensive portfolio of components for headrests and seat adjustments. Worldwide, in virtually all cars in the premium segment, guide bushings are fitted by ROS to lock the headrests.

ROS is extremely open to innovative technologies, and has begun to reap the benefits of a new service from Schunk: the gripper specialist now provides an online tool where companies such as ROS can upload the gripper step or STL data, or configure the required gripper finger by means of a few specifications with regards to material, gripper type, installment position and finger length. Once the order is confirmed, the required grippers are additively manufactured.

In two assembly plants for a Bavarian car maker, ROS has fully used the potential of the 3D design tool for the first time. Within two weeks, the additively manufactured gripper fingers were delivered to ROS — additively manufactured, with the contour precisely specified by the company.

Comparing the new service with a more traditional way of working, Christopher Lamprecht, production planner at ROS, says: “All in all, the online tool has saved a great deal of work in device construction. From developing the idea, to the first tests, milling operations and coordination, two days would certainly have been needed before. But with eGRIP, the effort was half an hour max.”

When the fingers were delivered, they worked straight away: “You mount the jaws, teach in your point, close them and that’s it. Awesome,” adds Lamprecht. The impact of this online shop for individually designed gripper fingers is impressive. According to Schunk’s estimates, it enables the design time for gripper fingers to be reduced by up to 97%. The production and delivery time is reduced by up to 88%. In addition, the finger price is reduced by up to 50%.

Eight to ten different sleeve variants can be produced for each machine today: for this, the guide bushings are separated on one linear unit and delivered suspended. A camera records the rotational position and transfers the values to the robot, which grips and places the sleeve precisely aligned on the rotary table using a multi-tooth guided Schunk universal gripper PGN-plus 64. At each station, springs, buttons and caps are then assembled. A second robot, which is also fitted with a Schunk PGN-plus gripper, serves to discharge NIO parts. For this, secure access must be ensured, regardless of which components were fitted before and which ones were not. The gripper jaws of the two Yaskawa robots used differed accordingly.

So that the material of the gripper fingers can be precisely adjusted for the specific application, there are three materials on offer from Schunk eGRIP: stainless steel fingers with a material density of 7.9g/cm³, a tensile strength of 700N/mm², an elasticity modulus of 190kN/mm², an elongation at fracture of 34%, and a tolerance of ±0.1mm (coating thickness 30µm) or ±0.2mm (coating thickness 50 µm) are primarily suitable for sophisticated applications in machine manufacturing. Fingers made of aluminium (AlSi10Mg) or polyamide 12 however show their strengths primarily in dynamic assembly applications. The latter, with a density of barely 1.09g/cm³, are extremely lightweight, resistant to chemicals, suitable for use with food products and can also be used reliably in connection with cooling lubricants and aggressive media.

Schunk also offers top jaws made of FDA-approved polyamide 12 (PA 2201) specially for use in the pharmaceutical and medical sector. For Lamprecht, the polyamide fingers also offer additional benefits: “While until now usually conventionally manufactured aluminium fingers had been used, we chose polyamide for the additively produced fingers. This will ensure that the sleeves are handled carefully.” With respect to the durability, Lampert is confident: “Up until now, the plastic fingers only exhibit minimal wear, which is very good news.” Looking forwards, he sees excellent implementation possibilities for the 3D printing fingers: “When we have to tightly grip difficult parts in the future, we will certainly use eGRIP again.”

Schunk has provided the order process with all sorts of options. If you don’t want to order the gripper fingers immediately, you can recall the automatically saved offer later using the configuration number, continue processing it or request it via email so as to submit it to the purchasing department later. The external contour of the generated modules, consisting of gripper, top jaws, and workpiece, can also be downloaded free of charge as an STL file and used directly for the construction of the system.

Follow-up orders are just as easy, because all orders can be recalled again, activated again or adjusted at any time. The intelligent web tool, for which there is a user guidance in German and English, is available for the Schunk PGN-plus universal gripper 40 to 125 (polyamide) or PGN-plus 40 to 80 (aluminium and stainless steel), for the pneumatically controlled Schunk MPG-plus 20 to 64 small-components grippers, and for the electrically controlled 24V Schunk EGP 20 to 50 small-components grippers. Orders can also be placed from EU countries and Switzerland.

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When Dansk Træemballage (DTE) looked at how to increase the precision and productivity of its sawmill one of the major challenges was to establish the right automation control network. As the biggest producer of wooden packaging in Denmark the plant includes over one hundred inverter drives, all of which needed to be controlled simultaneously and in real-time. The technology used was CC-Link IE, the only open gigabit Ethernet designed specifically for industrial automation tasks.

DTE’s sawmill is located in Ribe, Denmark and dates back to 1581. It is now the mainstay facility for the company’s pallet production activity. Everyday, approximately 35 trucks bring conifer logs to the saw line to produce lumber, resulting in over 300,000m³ of raw timber being processed every year. This is then exported or distributed across DTE’s five production sites to obtain 150,000m³ of finished wood that is used to assemble crates and pallets.

The sawmill comprises a number of stations, which turn logs into rough-cut timber and eventually finished lumber by performing debarking, profile cutting, sawing, sorting and stacking activities. All these stages require high-quality, reliable and responsive inverter drives to correctly position and power processing equipment such as grinding rolls and saw blades.

“Running a sawmill means continuously improving the speed and productivity to get the most out of the raw materials. A quality finish is also particularly important for DTE, as we mainly focus on the food industry, which has strict standards on the end quality of the crates and pallets,” Orla Poulsen, owner of DTE, explained.

An interconnected and responsive mill To keep operations at the site in Ribe smooth and efficient, DTE needed a communication network technology able to connect the inverters to PLCs and ensure that the machines could instantly adjust their parameters for optimal performance. Thus, the company appointed Hans Folsgaard as its technical partner to upgrade the plant automation system. Carsten Olesen, technical manager at Hans Folsgaard, agreed with Poulsen: “Accuracy is fundamental. This is why DTE asked us to find a fast network technology.”

Effective high-speed transfer of data creates a highly responsive system. Lars Venborg, technical manager at DTE, commented: “In order to improve the quality of our lumber and increase our productivity, we wanted better precision and a faster reaction from the variable frequency drives across the processing line. The old network had become slow by comparison and could no longer support our manufacturing needs.”

The choice of which network solution to use was immediate for Hans Folsgaard – the team selected the Ethernet technology with the largest bandwidth available; CC-Link IE. This provides data transfer rates of 1Gbps for high-speed communications. Also, by offering a maximum of 254 stations per network, the solution could accommodate all the variable frequency drives across the saw line as well as supporting future growth.

John Browett, general manager of the CC-Link Partner Association (CLPA) Europe, explained: “CC-Link IE is the world’s first and only open Gigabit Ethernet for automation. As such it offers higher performance capabilities than any other industrial Ethernet. DTE is using CC-Link IE to build a very large network of inverters that operate the sawmill. The result is higher productivity and increased business competitiveness as quality and output both rise, without changing the mechanical...
Bus controller overcomes CAN topology restrictions

The new Powerlink bus controller X67BC8780.L12 from B&R has an integrated hub for eight CAN connections. The star topology of the CAN network allows a higher maximum total cable length and better utilization of the bandwidth. It also greatly simplifies cabling. External CAN devices can be connected to each of the eight separate CAN lines with a standard CAN bus topology. Each line can extend out to the maximum length determined by the baud rate.

All eight CAN bus controller connections are terminated using integrated terminating resistors. Full FPGA implementation allows the hub to achieve minimal throughput times. The device offers IP67 protection and is suitable for installation outside the control cabinet.

According to its specifications, a CAN network can only be built as a line structure with very limited branch lines. The new X67 hub groups various CAN segments into a collision domain. It functions similarly to an active star coupler in a fibre optic network. With the active coupling, the individual segments are no longer subject to the restrictions of branch lines, which greatly simplifies cabling.

User-friendly, future-proof solution

By choosing CC-Link IE, DTE will also benefit from an easy-to-use system that simplifies management and maintenance in the future. “It is very easy to work with CC-Link IE. When we chose this solution, we also considered maintenance activities and the future of the sawmill. It will be very easy to replace or add inverters, when required, as we will not have to change anything in the software setup,” commented Venborg. And Carsten Olesen further explained: “CC-Link IE offers a smooth setup that does not require any programming.”

Not every network offers such a flexible platform to build upon. Venborg continued: “This was not the case with our existing system: we had to modify the software every time we replaced an inverter. As a result, we used to struggle with downtime, and we always needed both technicians and programmers to replace or add a drive, affecting uptime and productivity.”

CC-Link IE technology quickly proved its worth, with DTE instantly reaping the many benefits of the network implementation. Poulsen concluded: “CC-Link IE will help us to continuously improve the productivity and performance of our sawmill. Even better, we also are achieving this in a cost-effective manner.”

www.br-automation.com

Aspects of the plant machinery. It is very important that DTE can get the maximum yield out of each log. By benefitting from the high-speed response time and bandwidth that Gigabit Ethernet offers, the machines on the saw line can assess the dimensions of each log as it goes through the mill very accurately and in real-time. In this way, DTE can make the most of its raw materials.”

At each CAN connection, 200mA are available for the sensor power supply. The connections are short-circuit proof. The bus controller has a wide voltage range of 9-32V DC. All sensors used in the industrial and automotive sectors can be connected directly using a single cable. An additional connector allows the I/O power supply to be daisy-chained to additional modules. The M12 connection technology and use of prefabricated standard cables, commissioning teams can immediately begin setting up the machine without having to first tediously check cables.

A further new product from B&R is the X20SO6530 digital output module provides six safety relays on a unit with the X20’s standard 25mm width, allowing B&R to offer a cost-effective and space-saving solution for applications where numerous floating signals are needed. To meet safety requirements, positively driven feedback contacts must be evaluated in a manner that is appropriate for safety technology. This new X20 module evaluates this data internally, making it just as easy to use the six safe relay outputs as it is to use semiconductor-based outputs. The digital output module has single-relay isolated outputs with a maximum switching capacity of 230V AC, 6A or 24V DC, 6A.

www.cc-link.org
Electronic engineers help wine growers to vintage success

Behind the rise and rise of English wine, British engineers and technologists are busy developing new systems and aids for the vine growing industry. Mark Ingham tells his part of this story.

English wine is taking off, with more and more people recognising its award winning quality, and production growing by the year. A generation ago it was wise to steer clear of ‘British wine’, blends of cheap wine from generally unnamed sources. But since then a warming climate and improvements in viniculture has seen a whole new industry blossom. Commercial vines are now grown throughout the UK, predominantly in the south of England but also in Wales and even Scotland.

Viniculturists all over the world know that without treatment, large portions of any vine crop will routinely be lost to fungi, bacteria, and – the blight of the industry – mildew. The English growers also realise that, like all developing industries, as production grows so the need for efficiency increases.

Oxfordshire’s Heli-Lift Services has been pioneering the use of helicopters for spray treating grapevines, using technologies developed by neighbour Sensor Technology. It started in the historical vineyards of Douro Valley, Portugal where, with little room for tractors, Heli-Lift soon realised that aerial spraying was very much more efficient and cost effective than traditional manual methods.

Both HeliNav and LoadSense were developed by Sensor Technology. LoadSense is based on the company’s wireless torque sensor which the industrial world is very fond of. Helicopter operators took to it because, being wireless, there is no need to drill cable holes through the aircraft’s body panels – which would mean getting recertified for airworthiness.

The pilots asked if Sensor Technology could link the load information with accurate GPS positioning, to automated flight planning for optimised spray patterns, and HeliNav LoadMaster was born.

Wireless signalling

The load sensing and position monitoring technology developed by Sensor Technology is essentially simple, yet is accurate to very fine tolerances. LoadSense combines Sensor Technology’s wireless signalling with a strain gauge Load Sensor. It has the capability of wirelessly transmitting its data to a readout where it both displays live readings and records them to build up an exact profile of each operation. Its inbuilt 32MBit memory can hold up to 280 hours of data which can then be downloaded to a PC via its USB cable.

The load sensor transmits using the worldwide licence free frequency of 2.4GHz using two built in antennae. The cockpit mounted readouts provide the pilot with precise real time information in an easy to understand graphical format. The sensor can also send signals direct to handheld readouts so that assistants on the ground have the same live information.

HeliNav LoadMaster provides position information through an on-board GPS (global positioning system), inclinometer and accelerometer and helps pilots plot and follow flight paths, monitor flight times, fuel requirements, etc. As such it makes even the most complex spraying jobs simple and efficient. It also logs the weight of the load and the distance travelled, so that the helicopter operating company can provide the client with accurate work reports and precise billing as well as schedule timely maintenance.

Sensor Technology and other British companies lead the world in advancing electronic sensing and data handling systems and it works hand-in-hand with the English wine industry, which is equally innovative and successful.

There are now over 500 vineyards in Britain, the most northerly being on the Shetland island of Unst, 1400 miles north of Bordeaux and just 400 miles south of the Arctic Circle. They produce 5,000,000 bottles of world-class wine that competes with the best that Europe and the New World have to offer. These numbers are growing rapidly: 1,000,000 new vines were planted in 2016, which will eventually produce about 2,000,000 bottles of wine and people are clamouring to join the industry or increase their existing investments. Norfolk’s Winbirri Bacchus has been voted world’s best white wine, sparkling Nyetimber from Sussex is similarly acclaimed.

www.sensors.co.uk

Mark Ingham is sales engineer at Sensor Technology
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Charting the right course to efficiency in the marine industry

Spokespeople from British Fluid Power Association member companies Phoenix Hydraulic and Electrical Services, Hydraproducts and Rotec Hydraulics consider some of the challenges associated with effective use and maintenance of fluid power systems and related equipment within the marine sector.

One of the most challenging industry sectors for engineering sciences has to be marine, where technology must be designed and built to withstand the demanding conditions associated with the open seas. Therefore, within the fluid power and related systems and equipment industry, providers to the marine sector need to ensure their products are designed and built to be 100% fit for purpose.

Arguably the most glamorous market segment within the marine industry is superyachts. As many superyachts are based in warmer climes, such as the Mediterranean, the Caribbean or Dubai, the operation and maintenance of electro-hydraulic systems should be performed with equipment that can function effectively in very high temperatures.

Phoenix Hydraulic and Electrical Services specialises in the design, manufacture and installation of complete hydraulic systems for boats. The company’s products – all designed and manufactured in the UK – include hydraulic tender lifts, bathing platforms, balconies, stainless steel hydraulic cylinders and other large moving systems needed on board. All the company’s systems are designed and manufactured in its factory facility in the Midlands.

Additionally, the company is now able to install a PLC system to a boat’s Ethernet network, enabling Phoenix to monitor the equipment remotely from its head office. For example, if a bathing platform with a safe working load of 2500kg is subjected to 3000kg, the hydraulic cylinders will recognise the overload and sensors will alert the company that the system is being compromised. “Usually with a safe working load of 130kg, our passerelles are positioned in a box behind the steps and are used for boarding/alighting a boat – should the passerelle be subjected to excessive loads, the latest satellite monitoring technology will alert us immediately,” explains Phoenix Hydraulic and Electrical Services’ director and general manager, Elizabeth Noles. “In normal working circumstances, the passerelle will inform us when maintenance is required – the replacement of filters, the changing of hydraulic hoses, an oil change, etc.

To ensure the equipment remains in optimum working condition, we will arrange for maintenance engineers to complete the work at a convenient time.”

Concept to design

Rotec Hydraulics is another company active within the marine sector, covering both commercial and pleasure applications. Rotec provides service and installation facilities to local and national fishing fleets, as well as operating systems for fuel, fire and hydraulic services fitted to luxury yachts.

Within the bespoke luxury yacht market, Paul Prouse, managing director at Rotec Hydraulics, makes the point that time from concept to design based on budget can be difficult to predict as there can be many factors that increase design time over the original estimation.

“Customers may have been working for much longer periods (months or years) on their design concept requirements, and when it comes to our part, timescales are often short in relation to the overall project timescales,” he said. “What could be classed as R&D work for bespoke projects is not always thought about or included in project costings and timescales, which adds pressure on designers to get it perfect first time.”

Differing requirements

Prouse makes the point that an electro-hydraulic system that Rotec could fit on a superyacht would have to be compact, low maintenance and aesthetically pleasing whereas the same system fitted to a fishing boat would be rugged, industrial, easily maintainable and more cost sensitive. He adds that electro-hydraulics now offers a multitude of options that Rotec can then transpose to customers to give them system information, compact hydraulic systems, control interfaces and safety functionality.

Rotec’s recent collaboration on the WaveAccess project was another example of a successful application of the use of hydraulics in a testing marine environment. “Electronic control systems incorporating electronic valve control, electro-proportional valve control and actuator positioning feedback gives us a platform from where we can now control hydraulic actuators from a remote location without the need to be near to the hydraulic components,” he said.

Also active in the marine sector is BFPA member Hydraproducts. One of the areas the company is involved in
within the marine sector on a regular basis is
dewatering – closing bulkheads for dewatering
purposes for buoyancy in subsea. The company
manufactures a small hydraulic power unit which
has been very successful in the dewatering market.
Another area of Hydraproducts’ expertise concerns
LARS (launch and recovery systems), where
hydraulic system reliability is paramount in order
that divers can be deployed and recovered safely.
This is an area where Hydraproducts’ larger
hydraulic systems employ wireless condition
monitoring for maintenance scheduling.

Communication
With regard to the use of electrohydraulic systems
within the marine sector, Ben Lee, director of
Hydraproducts, reflects that effective
communication with OEMs or end-customers is
important when working with them to build or
maintain systems that contain hydraulics –
however, he points out that this can sometimes be
a challenge. “We find that the level of knowledge
and experience regarding hydraulic systems can
vary significantly among technicians within this
sector,” he said.

“Many of them within tend to be more controls-
oriented relying on things such as process
diagrams, so we find the technical language they
are used to can be rather different to that regularly
deployed within the fluid power industry. They
can be used to dealing with quite complicated process
valve systems and not necessarily hydraulic systems incorporating mechanical components. So, from the outset it can be the case that we need to
make them more aware of what a hydraulic system looks like and how it operates. The important thing
to get across is that these systems are not a
process, they are machines. So, the conversation
needs to be brought back to basics to some extent.”

Lee adds that communication is also important
from the standpoint of both the customer’s teams
and the equipment provider’s teams working
largely as a single unit. “They need to
be willing to absorb us within their
everyday activities because they often
don’t have the required level of hydraulic experience to
understand and use the equipment effectively,” he
said. “However, once the willingness to engage in
this level of conversation is achieved things tend to
go smoothly.”

Of course, each project can differ significantly
in terms of the type of equipment used. Also, there
can be a lack of continuity among different project
teams, and they can sometimes lack a central core of
shared skillsets. “Because of this siloed regime, we sometimes find that as soon as we have
finished liaising with and training one project team,
elsewhere within the same company there
might be another team in another geographical
region that still remains rather in the dark
concerning hydraulic systems,” explained Lee.

“If there was more of a consolidated methodology in place regarding training that would
certainly be more beneficial. General hydraulic equipment training is important, but even more
important is on-site training where guidance can be
given to personnel actually building and operating
the equipment.”

Digitalisation
And what of digitalisation, one of the current key
discussion topics within the fluid power sector and
engineering in general? “Many people within our
industry are talking about greater levels of
digitalisation, but in our experience there isn’t a
great deal of this technology being utilised in
practice – at least not yet,” said Lee. “However,
where it has been deployed it has been proven to
be very effective.

“One area where we have really seen customers
benefit in a major way is on the maintenance side –
for example, being able to analyse and plot motor
current pressures, oil contamination and so on –
all those indicators that give you lifespan predictions.
This is very valuable for equipment lease
companies because end customers within the
marine sector don’t want to worry about the uptime
of the machine – they just want to know what
they’re paying for is going to continue to work
efficiently.”

Fluid power and related equipment technology
continues to develop in order to satisfy ever more
demanding customer application requirements.
Enhancements can be found in a number of forms,
everything from more integrated electromechanical solutions to increased digitisation in
areas such as remote monitoring for operational
and maintenance purposes. Marine may be
one of the most technologically demanding
sectors, but the fluid power industry
certainly continues to rise to
the challenge.

www.bfpa.co.uk
Greater flexibility for high pressure applications

Eaton’s EC600 X-Flex hose provides 24% more flexibility for applications needing very high pressure performance in small areas

At up to 50% of the Society of Automotive Engineers (SAE) 100R15 bend radius, the EC600 X-Flex hose’s flexibility makes installation in tight spaces much easier while reducing the total amount of hose needed on each machine.

Designed to perform in very demanding, high impulse applications, including construction, mining and industrial equipment, the EC600 X-Flex features a highly abrasion-resistant DURA-TUFF cover material, supporting a longer hose assembly life during installation, while withstand ing over one million impulse cycles with an operating pressure of 420bar.

The hose offers both four and six spiral wire construction that is operable at temperatures from -40°C to +121°C with no fluid leakage between hose and fitting when the machine shuts down and the system cools. The EC600 X-Flex is compatible with Eaton’s 4S fitting series in sizes -12 and -16 and 6S fitting series in size -20 and does not require skiving operations. In addition, Eaton’s 1W type internal skive fitting series -12 and -16 and 6S fitting series in size -20 and does not require skiving operations. In addition, Eaton’s 1W type internal skive fitting series -12 and -16 and 6S fitting series in size -20 and does not require skiving operations. In addition, Eaton’s 1W type internal skive fitting series -12 and -16 and 6S fitting series in size -20 and does not require skiving operations. In addition, Eaton’s 1W type internal skive fitting series.

Flowmeter offers greater functionality

Burkert has released the latest update to its FLOWave flowmeter, which offers greater functionality and widens its appeal for the pharmaceutical sector as well as food and beverage applications. The list of new capabilities includes the ability to detect different fluids, which will open up new applications in many areas.

In very simple terms, the Type 8098 FLOWave uses a smooth stainless-steel tube, and surface acoustic wave (SAW) technology to measure fluid flow very accurately. It has already demonstrated many advantages in hygienic/water applications and the scope is now set to increase significantly with the latest model release.

The introduction of the density factor and acoustic transmission factor have helped improve accuracy for a wider range of fluids, as well as the detection of bubbles and solids. The density factor compensates for the change in the speed of sound at different temperatures. This enables FLOWave to detect a change of liquid in a running process, for example when a clean-in-place (CIP) process ends and normal production is resumed. Similarly, it can also detect the changeover point between two products and provide this information to the supervisory system. The acoustic transmission factor (ATF) allows FLOWave to detect bubbles or solids in the liquid and display this information as a percentage, which can be used by the process management system to take the appropriate action, depending on the level of inclusion.

The ATF can also detect pipe fouling over a period of time. Provided the same liquid is being transferred, trend analysis of the flow data over an extended period will highlight any issues with pipe fouling, or a reduction in pipe diameter that is causing reduced flow, increased pressure and lost performance.

FLOWave offers the opportunity to constantly monitor flow rates and total volumes to ensure process quality and uniformity.

High compression for light gases

Pfeiffer Vacuum’s HiPace 700H turbopumps are high-compression models. With a compression ratio of ≥ 2·107 for hydrogen, they are suitable for generating high and ultra high vacuum.

Due to their advanced rotor designs, HiPace 700H turbopumps have a high critical backing pressure capability of 22 hPa. This allows the pumps to reach ultra high vacuum, even when operating with high backing pressures.

Camozzi updates precision regulators

Camozzi Automation has introduced a new variant in its Series PR range of precision regulators with manual override. Complementing the existing PR1, PR2 is now available in two thread options 1/4in and 3/8in.

The new product employs the same pressure regulation feature with multiple diaphragms as is used in PR1, combining it with a larger passage section that, by means of poppets, increases flow. Improvements to sensitivity, regulation stability and high flow were all key objectives in the development of PR2 and many of the features of the new regulator have also been incorporated into PR1, enhancing its performance.
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Connect to our solutions on www.staubli.com
Anti-vibration mount range extended with new designs

WDS has extended its range with new marine engine anti-vibration mounts and cone cab mounts. The new marine engine anti vibration mounts are designed to support the thrust loads generated by propeller drives. They are made to a very low profile design which makes them versatile and easy to install, even in the confined spaces typically encountered in shipboard projects. The cone cab mounts are intended for use with compressors, engines and pumps. Their geometry is optimised to absorb high shear and compression stresses while accommodating axial deflection.

www.wdsltd.co.uk

Precise magnetic encoders for industrial applications

Being a UK business partner of Bogen Electronic, Motion Control Products now introduces the German branded magnetic encoders (magnetic sensing heads and scales) for length, rotary and angle measurement systems.

Bogen’s pioneering precise measurement technology enables magnetic encoders to reach precision and accuracy previously only offered by high end optical devices, but at far more modest prices. These magnetic heads comply with the relevant national and international standards (ISO, DIN, IATA, ABA, etc).

The typical applications include metrology, microscopy, robotics and more. Special solutions for reading magnetic ink (Magnetic Ink Character Recognition: MICR) and for recognising and validating banknotes are also a part of the magnetic sensing portfolio.

www.motioncontrolproducts.com

Servo control for voice coil and single phase motors has 192kHz rate

Aerotech’s XL4s linear amplifier is designed for closed-loop servo control of voice coil and single-phase motors, eliminating the non-linearities common with PWM amplifiers. The XL4s provides deterministic behavior, auto-identification, and easy software setup and features a multi-core, double-precision, floating-point DSP that controls the digital PID. All parameters are software-settable including control-loop gains and system safety functions. With the XL4s, you can achieve industry-leading settling times, long-term thermal stability, and sub-micron-level tracking accuracy with advanced features such as full state feed-forward, 192kHz servo rates, and look-ahead-based velocity control.

www.aerotech.com

What’s New?

Our look at the month’s most interesting product launches

The kit you need

Simmatic has launched its new MPM range of versatile pumps that can produce vacuum flows as high as 5,700Nm³, making them ideal for use in the most demanding manufacturing and packaging applications. Powered by compressed air, these innovative pumps are exceptionally quiet in operation and offer stable, reliable operation even with fluctuating air supply pressure.

MPM pumps provide performance comparable with electrically-driven vacuum pumps rated up to 4kW but are much more energy efficient. In many applications, their efficiency can be further increased by fitting the optional air-saving kit, which turns off the compressed air flow as soon as the required vacuum is reached.

Other benefits of these innovative pumps include compact construction. This usually means they can be accommodated close to the point where the vacuum is required, eliminating the need for complicated pipework. The design has no moving parts, which means no routine maintenance is required.

www.simmatic.co.uk
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Two-wheel motorsport has a whole range of different vehicle classes, down to single-cylinder machines. The limited engine power of these bikes is not a disadvantage, if the weight – ie the mass to be accelerated – is also reduced considerably. Here, plastic bearings make an important contribution.

At Krämer Motorcycles (KMC), the Supermono racing bike not only won the title in the single-cylinder championship, but is doing well in the current Super Twin season. The HKR-EVO2 bike has a top speed of 140mph. In the recent Tandragee 100 road race in Northern Ireland, Shaun Anderson achieved an average speed of 100.485mph becoming the first and only racer to surpass the magical 100mph mark on a single-cylinder motorcycle.

Although the company is still relatively young, a lot of development work has gone into the machine. It began in 2009 as a private project of three friends, Christof Henco, Markus Krämer and Nico Rothe – whose initial letters (HKR) denoted the type designation – to develop their own motorcycle purely for motorsport purposes. This led to the founding of Krämer Motorcycles in 2014 by Markus Krämer, who previously worked as a development engineer at KTM. Accordingly, the decision for the central component was not difficult: the single-cylinder engine KTM 690 LC4 served as a drive unit from the beginning. Around this was built the rest of the bike, partly with standard parts and partly with self-developed components.

The chrome-molybdenum steel tubular frame weighs just 6.5kg – a third of the weight of the standard frame used on a KTM series machine. The tail boom made of XPE plastic is another highlight of the racing machine built in Töging. Seat and tank are joined together here, which also saves a lot of weight. "One of our design principle is to combine multiple functions in one part and thus reduce the component count and thereby the mass to be moved," explains Markus Krämer, CEO of KMC.

KMC looks at each and every component and tries to come up with in-house developments that meet their own requirements instead of using standard products. Weight reduction is of prime importance – the less, the better. Since the maximum power of a single-cylinder engine is limited, the only way to secure a speed advantage is to reduce its mass.

The latest development is the new link system for the rear swinging arm, which connects the rear wheel to the frame via a damper. The shaft of the previous link system comprised of nine metal parts, which had to be laboriously assembled and lubricated. The new design, on the other hand, only needs two press-fit lubrication-free plastic bearings and can be operated maintenance-free. Another advantage is that the weight is reduced by about a third: from 535 to 355 grammes. And last but not least, the price of the components – including the iglidur Q flange bearings – is significantly lower than that of the previous design.

Igus products have already been proven in various other places. For example, two igubal rod ends transfer the power in the foot brake. The footrest system uses iglidur J plain bearings, and the deflection shaft of the gear shift system is also connected with an iglidur plain bearing. Krämer also uses iglidur J plain bearings for shift and brake levers.

The effect of this combination of lightweight body and extreme braking power surprises and excites riders alike. Conventional 80-horsepower machines are regarded as underpowered, the HKR-EVO2 weighing only 125kg cuts a good figure with this drive against much more powerful, but heavier motorcycles in the field. Strong braking deceleration and precise track guiding despite high cornering speeds with extreme riding positions bring the racing machine forward, especially on stretches with tight bends. The result can be seen in Töging: numerous winners' cups decorate the shelves in the production hall.

www.igus.co.uk
Hydraulic handbook is packed with useful data

Miniature component specialist Lee Products has recently published Edition 12 of its Technical Hydraulic Handbook a catalogue which embodies over 70 years of innovation in miniature fluid control. The 800+ page handbook includes around 100 pages of engineering reference information to assist engineers in the design and analysis of fluid systems.

The handbook features two new sections covering combination and shut-off valves and positive displacement pumps along with 46 additional products, expanded information on custom capabilities and updated introduction and installation sections.

Products featured include: plugs, restrictors, metering valves, control valves, check valves, pressure relief valves, shuttle valves, combination valves, shut-off valves, safety screens, solenoid valves and positive displacement pumps.

Accompanying the handbook is a flashdrive which contains a fully indexed PDF file of the hard copy book with links to all the relevant sections of The Lee Company web site.

Lee Products has been a pioneer in the development of miniature, precision fluid control components for use throughout industry since 1948. Markets served include aerospace, down-hole tools, machine tools, medical/scientific instrumentation and ink-jet printing.

Lee's unique capabilities in miniaturisation and engineering expertise have kept the company at the forefront of fluid flow technology.

www.leeproducts.co.uk/request_information.htm

Enclosures are enhanced for extreme applications

The new Rittal VX25 large enclosure system delivers significantly enhanced value to electrical engineering companies thanks to its technical features, ease of assembly and high levels of safety. Now, new versions of the VX25 are available in stainless steel and NEMA 4X to enhance corrosion protection and to ensure the equipment within is shielded from dust, as well as from splashes and jets of water. The VX25 large enclosure system is now available in stainless steel to deliver the highest level of corrosion resistance. The frame structure, doors, panels and the gland plate, as well as all the external parts are all made of stainless steel.

www.rittal.co.uk

Micro stepper motor and drive certified for hazardous areas

Following last year’s launch of its STAC-6 series ATEX, IEC-Ex and UL hazardous location certified microstepping drive, Applied Motion Products (AMP) has released a compatible stepper motor – allowing a complete internationally certified motor and drive package for machine automation applications in high safety industries where explosive atmospheres are commonly found such as oil and gas, mining and printing.

Available with full support from McLennan, the new stepper motor is certified for Class I, Zone 1 locations and would typically be installed in highly hazardous areas with the matching STAC-6 drive, which has a Class I, Zone 2 certification, and suits a physically isolated location. The new HX56-100 motor has a NEMA 56 frame with a nominal diameter of 134mm and length of 170mm. Its environmental rating is IP66/Type 4X. The high torque design is optimised for microstepping and yields an approximate power rating of 250W

www.mclennan.co.uk

Enormous acceleration with disc magnet technology

Following the acquisition of Dimotech, a Swiss manufacturer of high-performance stepper motors, Faulhaver now also offers this motor type with higher power and greater dynamics. The primary difference between disc magnet motors and conventional motors is the disc magnet motor’s extremely light rotor. It consists of a multi-pole magnet in the shape of a disc mounted on the motor shaft. Its low weight minimises the rotor inertia and enables an acceleration that is unattainable for these dimensions by any other technology. Thus, this motor type is ideally suited for applications in which the speed or direction changes often and quickly, or where very small and precise step movements are required. In addition, the size of the magnet poles as well as the shape of the magnetic circuit are arranged to deliver the highest possible torque with respect to the rotor dimensions.

www.ems-limited.co.uk

Enclosures for machine control equipment

Rolec has launched its new profiPANEL command enclosures. These stylish, tough and highly versatile enclosures offer an economic solution for housing machine control equipment. IP65 rated profiPANEL is ideal for a wide range of industrial applications. It can be mounted from the top or bottom on Rolec’s profiPLUS 50 suspension arm system or to a wall or machine housing using the optional 180 degree pivot bracket. Thanks to a wide range of depths, profiPANEL can accommodate all types of displays and electronic control equipment.

www.rolec-enclosures.co.uk/en/Command-enclosures/profiPANEL.htm
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