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Suffering of late with a rather nasty cough, Mrs Simms was keen to check that she wasn’t keeping me awake through the night. “It did at first,” I said, munching through my breakfast. “But I soon got used to it, like the way you do with a particularly loud clock.” The usually affable Mrs Simms looked a bit miffed at this, as she checked: “So in this scenario, I’m an annoyingly clamorous clock?”

Realising I might have started digging a hole for myself, I scrabbled to climb out, saying: “Not necessarily a clock; perhaps either a train or a plane, depending on where we lived. Although they tend not to fly at night, so the metaphor doesn’t quite hold.”

It became clear to me that Mrs Simms was failing to focus on the positive, which was of course that I was managing to enjoy an unbroken night’s sleep in the face of her constant hacking. Despite our somewhat bleak house, it seemed there was a good chance I could come through the whole thing relatively unscathed, leaving me optimistic for the evenings ahead.

Sensing a possible way out of my deepening hole, I suggested to Mrs Simms that she was bit like 2019. Plenty of doom and gloom, and with the potential for things to get a lot worse. Economically, we’ve had the constant threat of the fallout of a disorderly Brexit, early warning signs of a UK recession amid a global slowdown, and nothing but bleak prospects for the year ahead.

But expectations have lifted. Economists are forecasting modest growth for 2020 in the UK, and the IMF goes further in its latest World Economic Outlook to predict a recovery in global growth. At a time when everything seemed to be going backwards, that’s reason for optimism. Of course, so much of the growth potential for the UK depends upon an orderly Brexit, and we’re not out of the woods yet, with Boris Johnson still holding the threat of a hard departure from the EU should we not have a trade deal in place by the end of the year. But for now, it feels as though we can finally put some firm plans in place, invest in our businesses with a little more confidence, and aim to be fast out of the traps as sentiment improves.

I took another bite of toast and looked across the breakfast table to see if I was back on firmer ground. Mrs Simms coughed.

Mark Simms
Editor
ELECTRIC MOTORS ON TEST
EDF Energy is using dynamic motor test equipment from SKF to monitor the condition of key components at Hartlepool power station, helping to improve the reliability of plant, which is scheduled to continue running until 2024.

SERVO SABOTAGE
the 8 best ways to consistently sabotage or damage your coupling driven system, and how to avoid them in the future

06 08

The era of Industry 4.0 means that today’s engineers need the knowledge and confidence to use technical tools and software, as well as possessing other digital credentials.

Following a customer request to trial an RF wireless electronic position indicator system, machinery manufacturer WestRock Linkx has now adopted the system as a standard option across its range.

LINEAR MOTION
IKO Nippon Thompson is a specialist in the manufacture and sales of precision positioning tables, needle bearings and linear motion guides – perhaps the best kept secret in linear motion and positioning.

ONTHEFRONTCOVER
The nanoScan3 safety laser scanner from Sick enables the highest level of responsiveness when safely adjusting a machine’s speed and direction

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CONTROLLING ENERGY FLOW
In the recently developed EnWheel flywheel energy storage units from German company Stornetic, Combivert F6 drive controllers from KEB control the energy flow together with specially developed sine-wave filters.

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A report from MakeUK in partnership with Squire Patton Boggs highlights the cost to industry of the Brexit delays over the past three years, and warns that we are not out of the woods yet.

14

Mike Page explains why thin section bearings should be on every design engineer’s radar where space is tight, weight saving is required and where the tolerances are extreme.

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A new machine has been hailed as revolutionising the world of 3D printing. Key to the operation of the innovative machine are linear slides from HeppoMotion.

ON THE FRONT COVER
The nanoScan3 safety laser scanner from Sick enables the highest level of responsiveness when safely adjusting a machine’s speed and direction

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KEEPING THE FLAPS CLOSED
The safety concept for a horizontal mixer had to be adapted as quickly as possible. Within a few days, Pilz worked with specialist machinery manufacturer to incorporate the safety gate system PSENmlock, which meets the new requirements.

ADAPTIVE SKIER IN THE FAST LANE
DynAccess offers four models of mono-skis, and they are designed to be more durable, adjustable and responsive than any other mono-ski on the market. Some of the key components in the DynAccess mono-skis are manufactured by Igus.

ROBOTIC AUTOMATION
Robots from Stäubli are playing a leading role in the manufacture of lithium-ion battery packs for the latest electric vehicles.

When building machines, it is vital to ensure that the CE/UKCA marking is considered from the start. If this isn’t done, a number of common problems can occur.

British company Mechan Controls is looking to be the first name in machinery safety on the global market. Mark Simms spoke to managing director Mabruk Farrah.

Mitsubishi Electric’s SafePlus option helps to turn hundreds of industrial robots into co-operative solutions, with safety monitoring functions that allow the robot to adapt to different conditions.

A collaboration between Fanuc and Sick has pioneered new safety integration for robot machine tending that points the way towards simpler, more cost-effective and adaptable solutions in future.

TENTS
60% of jobs in manufacturing require specific digital skills

THE ERA OF INDUSTRY 4.0 MEANS THAT TODAY’S ENGINEERS NEED THE KNOWLEDGE AND CONFIDENCE TO USE TECHNICAL TOOLS AND SOFTWARE, AS WELL AS POSSESSING OTHER DIGITAL CREDENTIALS

For many, the start of a new year is the perfect incentive to make important changes to their life. One aspect a lot of Brits will tend to focus on is their job – as they look to move to another company or even pursue an entirely new career path. Recent research by workplace accreditation body Investors in People found that 24% of Brits will actively seek a new role in 2020.

The Knowledge Academy analysed the latest findings from Gov.uk, which analysed over eight million job adverts, to discover the UK industries that most and least require job applicants to have specific digital skills. The Knowledge Academy found that jobs in information and communications (79%) most require candidates to have specific digital skills, closely followed by manufacturing, where 69% of roles desire specific digital competencies from prospective applicants.

Slightly below, 66% of openings in the finance and insurance sector need job hopefuls to have certain digital skills. At the other end of scale, positions in human health and social work (16%) least require candidates to have definitive digital proficiencies. Slightly above, only 21% of roles in education need applicants to have specific digital capabilities. Additionally, The Knowledge Academy surveyed 562 UK employees (who plan to change their job this year) to find out the mains barriers preventing them from developing their existing digital skills as well as learning new digital skills to significantly boost their career prospects. From this, The Knowledge Academy found that a ‘lack of time’ (72%) is preventing a majority of employees from learning/developing valuable digital skills.

Stumbling blocks for digital skills

The other stumbling blocks stated by respondents include: ‘Not knowing where to start’ (67%), ‘feeling too lazy/tired’ (64%), ‘fear of failing’ (59%), ‘believing learning resources/courses will be too expensive’ (51%), ‘believing relevant learning resources/courses will be too hard to find’ (45%) and ‘feeling too old to learn new skills/digital skills’ (23%). Joseph Scott, a spokesperson from the The Knowledge Academy.com commented: “It’s that time of the year where individuals are contemplating their careers and wondering if their job is giving them enough fulfilment. Those who conclude that they are unhappy in their current position, will undoubtedly search for new opportunities.

“Given that most industries have now been revolutionised by technology, companies need employees who can comfortably use different digital tools, programs and software to drive business performance as well as achieve set objectives. Those entering the job market need to be aware of this, as this research clearly shows that certain industries are more demanding of particular digital skills than others.”

For more information, please visit: https://www.knowledgeacademy.com
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Sigma-7 servo drives feature a host of cost-saving functions ensuring high overall equipment efficiency, easy implementation, commissioning and use. Additional functions such as vibration suppression reduce stress on machine parts, significantly improving control performance.

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- Designed for increased throughput with auto-tuning reducing setting time down to 4ms.
- Superior control thanks to 24 Bit resolution encoders combined with 3.1 kHz control loop.
- Improved quality with vibration suppression, power ripple compensation for higher precision and smoother edges of machined parts.

Find out more at: www.sigma7.eu

Contact YASKAWA UK Ltd
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Upgrade delivers faster changeovers

FOLLOWING A CUSTOMER REQUEST TO TRIAL AN RF WIRELESS ELECTRONIC POSITION INDICATOR SYSTEM, MACHINE AND PRODUCTION LINE MANUFACTURER WESTROCK LINKX HAS NOW ADOPTED THE SYSTEM AS A STANDARD OPTION ACROSS ITS RANGE

WestRock Linkx Systems manufacture machines and integrated lines for shelf-ready packaging. Solutions include BoxSizer automatic and semi-automatic warehouse dispatch 3PL ecommerce packaging lines. It also manufactures labour saving semi-automatic re-packaging solutions for contract pack and 3PL companies.

A visit by a customer to the PPMA show introduced Elesa’s RF wireless electronic position indicator system. The customer subsequently asked WestRock Linkx to trial this system in order to speed up machine changeovers while ensuring reliable, repeatable accuracy. It proved to be a like-for-like fit in place of the position indicators previously installed. This enabled faster re-sets by use of an automated controller via the machine PLC, reducing operator time and operator error.

Customer satisfaction was high across a range of machine installations leading to an end user comment that “this cost-effective upgrade was added to our machines in under two days, and has already made huge improvements to product change overs and set-up times.”

The team at WestRock Linkx was likewise impressed Tom Whatling, technical sales manager, explained: “The Elesa wireless electronic positioning system enables faster and more reliable machine setup by use of a wireless connected profile controller, which displays the initial setup values on each of up to 36 electronic position indicators.

“The system is now a mainstream option on all our machines and can be retrofitted to our installations – even to other manufacturer’s machines where we are upgrading a complete facility.”

Elesa’s RF electronic positioning system enables quicker and more reliable machine set up by use of a wireless connected profile controller, which displays the initial set up values on each of up to 36 electronic position indicators. The operator can simply choose the appropriate menu then quickly re-set each spindle to its correct start position and the machine is good to go. This saves time and takes out much of the possibility of human error. Elesa DD52R-E-RF position indicators are networked to the UC-RF control unit by radio connection thus enabling an easy and quick installation. Current and target positions are transmitted by RF to and from the control unit, facilitating rapid machine set up.

The system consequently saves time during the format alignment process. Once the setup profile has been called up by the PLC, the control unit UC-RF transmits the target position to each DD52R-E-RF position indicator. The current/target position is displayed on the LCD of the DD52R-E-RF. The operator manually sets the position of the spindles following the arrow displayed on the LCD (clockwise/counter-clockwise rotation). Once all the spindles are correctly set, the UC-RF control unit communicates to the PLC of the machine that the setup has been completed – the system prevents the start of the machine until the set-up has been completed, for safety reasons and to prevent loss of production from incorrect settings.

The UC-RF controller can network with up to 36 position indicators and is compatible with PLC Interfaces: RS232, RS485, Ethernet/IP, Profibus and Modbus. The DD52R-E-RF (IP67) position indicator 6-digit display mode can be selected by the operator.

MORE INFORMATION: WWW.ELES.CO.UK

Igus initiates first recycling programme for energy chains

What happens when a plastic energy chain reaches its maximum service life? Usually, it is disposed of and incinerated with other plastic waste. With its ‘Igus green change recycling program’, Igus is now doing something completely new: users can send their plastic chains to Igus for recycling – irrespective of the manufacturer. They can eliminate disposal costs and also receive a voucher for making purchases from Igus.

In the UK, over 5 million tonnes of plastic is consumed each year – and yet only a quarter of it is recycled. Even though a long-lasting plastic energy chain is not comparable with single-use plastics, the question of how to dispose of it at the end of its service life still arises. Normally, the energy chain is disposed of together with other plastic waste. Recycling rarely occurs as the cost of separating the different materials in a product and recycling them to make usable granulate (grinding) is too high. In most factories, the usual procedure is therefore to remove energy chains from their machines and throw them into industrial waste skips for incineration. Igus is now offering an environmentally friendly alternative.

The aim of the program is to recycle the plastic from energy chains and reuse it for new products. To this end, after cleaning them, users can send their old out-of-use plastic energy chains to Igus – irrespective of the chain’s original manufacturer. The plastics are then sorted, cleaned, shredded and packed. After this, they can be reused. In return, the customer receives a voucher amounting to £0.25 per kilogram.

Igus CEO Frank Blase said: “This is not something new for us. As the world’s biggest manufacturer of plastic energy chains, we already recycle 99% of the plastic waste occurring in production. The ‘change’ program is now the next important step in the direction of sustainable business operations.”

MORE INFORMATION: WWW.IGUS.CO.UK

Baumer announces partnership with MGA Controls

Sensing and instrumentation specialist Baumer is pleased to announce the appointment of MGA Controls as a process solutions partner. As a well-established control and instrumentation specialist, Lancashire based MGA Controls is delighted to underline this commitment following the agreement with Baumer. Jon Sumner, managing director of Baumer UK said: “This closer alignment between MGA Controls and Baumer provides us with greater access to MGA customers ensuring a more targeted approach to promoting individual products and delivering the most appropriate application solutions.”

Describing MGA Controls as a one stop shop, sales manager Chris Makin added: “We This agreement with Baumer means we can offer an even more comprehensive range of products which ultimately results in optimal control and automation systems for our customers.”

MORE INFORMATION: WWW.BAUMER.COM/GB/EN
You’ve never seen a solenoid valve like this before.

High Flow, Low Power, Low Leakage Across an Extensive Cycle Life

The Lee Company is excited to announce a new generation of versatile and innovative 3-port solenoid valves. In a miniature 10mm package, the genvi™ solenoid valve platform features high flow capacity, low leakage and ultra-low power consumption. Designed using innovative manufacturing techniques, this new valve offers not only unmatched reliability, but also an economical price point suitable for molecular diagnostics, respiratory therapy, compression therapy, environmental monitors, breath analyzers and other applications where performance and reliability are paramount.

When designing portable or stationary instruments, OEMs are often challenged with meeting aggressive size, power, and weight limitations, all without sacrificing the remaining elements of system-level performance. Each subcomponent is therefore pushed to offer improved performance within a smaller footprint.

Featuring high flow and low power consumption, genvi solenoid valves are the solution. An extremely tight leakage rating reduces compressor demand and further underscores the valve’s ability to provide consistent long-term operation across an extensive cycle life.

Custom valve solutions, supported by The Lee Company’s engineering experience in microfluidics, are also available to meet specific application requirements.
COUNTING THE COST OF

A REPORT FROM MAKEUK IN PARTNERSHIP WITH SQUIRE PATTON BOGGS HIGHLIGHTS THE COST TO INDUSTRY OF THE BREXIT DELAYS OVER THE PAST THREE YEARS, AND WARNS THAT WE ARE NOT OUT OF THE WOODS YET, WITH KEY QUESTIONS REMAINING UNANSWERED

The sizeable conservative majority in the General Election has removed the immediate threat of a no-deal Brexit, and should signal an orderly withdrawal on 31 January. But with Boris Johnson committed to ending the transition period at the end of the year whether a trade deal is in place or not, the threat of a no-deal Brexit lingers. The reality, therefore, is that manufacturers must prepare – those who have taken steps must ensure they remain prepared, and those who have more to do should do it now.

The EU has been our largest and most integrated trade partner for decades. Extracting ourselves from this partnership in a way which protects the UK’s manufacturing sector requires significant further Government engagement, investment and time. With manufacturers’ confidence in the overall economy down by almost half over recent months it is clear that manufacturers are not optimistic about our economic future.

Some 64% of manufacturers say Brexit delay and uncertainty has had a directly negative impact on their company’s profit margin in the past two years. And almost half of manufacturers have already experienced a noticeably negative change in EU customer and supplier appetite towards doing business. Further, some manufacturers are reportedly being asked to meet any potential financial implications, such as increased tariffs, should they materialise in the course of a contract. All this adds up to halted or diverted investment hampering the present and future growth of UK manufacturing.

The lingering threat of no-deal has been enough to lose customers and cut jobs. A number of manufacturers are downsizing or completely shutting down in the UK. Even the most profitable market leaders are suffering. But, more alarmingly, UK manufacturers overwhelmingly believe there is more custom to be lost in the event of a no-deal Brexit, with just 2% believing that a hard exit could increase the appetite of EU businesses to deal with UK companies.

Customs processes
Preparing to send and receive goods between the UK and the EU post-Brexit means more than just import duties: it will mean complying with processes, leading to bureaucracy, delays and further costs. And while the Government has encouraged businesses to prepare for a no-deal Brexit, evidence shows that there is more to do.

All exports (and imports) that are commercial in nature must be declared to customs and require an export declaration; in a no-deal Brexit scenario it is anticipated that there would be a fivefold increase in the number of declarations, from around 55 to 275 million, being made each year. Businesses need to decide whether to complete the additional customs documentation themselves or to outsource it. Owing to the current Brexit uncertainty, many manufacturers are understandably cautious about investing significantly in training or taking on additional staff with customs experience. This creates a barrier to preparedness.

As a basic starting point, all businesses must have an EORI number to identify them and record their exports and imports. As of June 2019, fewer than one-third of eligible UK manufacturers had successfully been issued with their EORI number. And fewer than 30% of manufacturers have applied to adopt a customs special procedure to help with cashflow or mitigate against import duties. The uptake of Authorised Economic Operator (AEO), also known as Trusted Trader, status has, however, increased recently. After 11 years of slow growth since its introduction, numbers have increased by 50% in the past six months. Holding AEO accreditation puts a business in the best possible position for facilitation by HMRC and can assist in quick clearance of goods at the border.

Then there is Transitional Simplified Procedures (TSP) which allows importers to defer giving a full declaration until after the goods have crossed the border, and to pay any duty owed a month after the import. Despite these benefits, fewer than 10% of eligible businesses had registered for TSP status by the end of May 2019.

UK BUSINESSES EXPORT A TOTAL OF £228BN OF GOODS AND SERVICES TO THE EU ANNUALLY. THE HIGHEST VALUE ITEMS ARE KEY ELEMENTS OF THE MANUFACTURING SECTOR

<table>
<thead>
<tr>
<th>UK goods exports to the EU, 2018. Source: HMRC, UK Trade info</th>
<th>£ billions</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum, petroleum products</td>
<td>20.6</td>
<td>12.0%</td>
</tr>
<tr>
<td>Road vehicles</td>
<td>17.3</td>
<td>10.1%</td>
</tr>
<tr>
<td>Medical &amp; pharmaceutical products</td>
<td>10.9</td>
<td>6.3%</td>
</tr>
<tr>
<td>Other transport equipment</td>
<td>9.1</td>
<td>5.3%</td>
</tr>
<tr>
<td>Miscellaneous manufactured articles</td>
<td>8.7</td>
<td>5.1%</td>
</tr>
<tr>
<td>General industrial machinery</td>
<td>6.9</td>
<td>4.0%</td>
</tr>
<tr>
<td>Electrical machinery &amp; appliances</td>
<td>6.8</td>
<td>3.9%</td>
</tr>
<tr>
<td>Power generating machinery</td>
<td>6.3</td>
<td>3.7%</td>
</tr>
<tr>
<td>Clothing &amp; clothing accessories</td>
<td>5.4</td>
<td>3.1%</td>
</tr>
<tr>
<td>Organic chemicals</td>
<td>4.5</td>
<td>2.6%</td>
</tr>
</tbody>
</table>

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Manufacturers have reported that the application process for AEO and Special Procedures is time consuming, particularly where a pre-approval audit visit is required. Delays and bureaucracy are particularly off-putting to companies when the Brexit deadline keeps moving.

Exporting services
UK manufacturers do not just export goods to the EU – they are increasingly exporting services too. The single market benefits plus the geographical proximity of our EU neighbours puts the UK in the top three of intra-EU market benefits plus the geographical proximity of our EU particularly where a pre-approval audit visit is required.

In January 2020, UK manufacturers do not just export goods to the EU – Exporting services

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Services in this context means anything that is not goods, ranging from service engineers travelling on site to EU customers to what businesses would call short-term business trips (STBTs) – meeting a customer or receiving or delivering training. Post-Brexit barriers to the delivery of services would have significant ramifications for this growing market.

It is also important to consider regulatory alignment. UK manufacturers have long relied on the EU’s adoption of a common approach to rules and regulations, particularly for technical regulations. This alignment has been a key advantage for UK companies building strategic trading and service relations with European and global customers and suppliers. And vice versa.

In a no-deal Brexit, the UK Government has stated its intention to ensure, as far as possible, that the same laws and rules will apply as are currently in place. The reality is that this is not always going to be possible. Survey results suggest that nearly two-thirds (64%) of respondents understand that changes will be introduced that will affect product labelling for goods destined for the UK and EU markets respectively.

More worryingly, fewer than one-quarter of respondents (23%) have taken action to identify and make arrangements for the notification process to be undertaken at an EU Notified Body if they intend to place goods on the EU market after Brexit day. The majority will need to investigate urgently new arrangements with Notified Bodies in the EU 27 as the UK falls back on WTO rules. This means that UK Notified Bodies will no longer have a role in regulated product conformity assessment across the EU/EEA.

Even in a no-deal scenario, the UK would need to negotiate a new relationship with the EU. While there would be pressure from both sides to negotiate quickly, the reality is that trade agreements take many years to negotiate. The UK’s negotiating position would be equal to that of any third country. And the UK–EU discussions would need to start against the backdrop of the UK having made an abrupt and harsh exit from the EU.

A key element of negotiating our new trade deal with the EU will be access to the EU’s 40+ free trade agreements across the globe, covering many of the UK’s key export markets for manufacturers. While the UK Government has deployed considerable resources to prevent disruption in trade by replicating the EU’s trade agreements with third countries, the job is far from complete. To date, the UK has signed or agreed in principle only 12 of the so-called continuity trade agreements, and it is not yet wholly clear that these deals retain all of the benefits contained within the previous arrangements.

This means that, should the UK leave the EU without a deal, our trade with key markets such as Canada, Japan and Brazil could be significantly disrupted. Canada, in particular, refused to roll over the trade deal on the basis that the UK was unilaterally abolishing tariffs, showing an immediate impact of the Government’s proposals for a no-deal Brexit. As such, manufacturers should prepare for considerable uncertainty in the years to come. For the duration of this period of uncertainty it is important to recognise that UK manufacturers will find it increasingly difficult to retain existing contracts with EU customers, while winning new business may be even harder.

Target export markets for UK manufacturers. Source: MakeUK

Before Christmas, the University of Sheffield officially opened its Advanced Manufacturing Research Centre (AMRC) Cymru, a £20m state-of-the-art research and development facility in North Wales. As a member of the AMRC, Schunk UK played an integral role in the opening ceremony, holding the ribbon with a Schunk gripper for Wales’ First Minister Mark Drakeford to cut the ceremonial ribbon.

Described by Welsh government ministers as a ‘game changer’ for the economies of Wales and the northern powerhouse, the AMRC Cymru is a purpose-built research and development facility close to the Airbus wing-manufacturing plant in Broughton. It was officially opened by Mark Drakeford and Economy and North Wales Minister Ken Skates, who accompanied Professor Koen Lamberts, president and vice-chancellor at the University of Sheffield, on a tour of the new building to see the new technologies that will be available to manufacturing companies across Wales.

Situated in the Deeside Enterprise Zone, the facility will operate a 2,000sq/m open access research area focus with a focus on advanced manufacturing sectors such as the aerospace, automotive, nuclear and food. This region has a strong manufacturing base and AMRC Cymru will build on this, driving world-class research and expertise across the supply chain. It could increase Gross Value Added (GVA) to the Welsh economy by as much as £4 billion over the next 20 years.

Holding the ceremonial ribbon for the First Minister was a Schunk Co-act gripper attached to a Kuka Cobot that was mounted on a Kuka AGV. The EGH Co-act gripper is the latest addition to the Co-act gripper family and is a flexible system for gripping and moving of small to medium-sized workpieces in the areas of handling, assembly and electronics. The long stroke of the gripper can cover a very wide range of workpieces as the gripper fingers are particularly suited for positioning over the entire stroke. The robust parallel movement of the fingers ensures constant gripping force at a position over the entire stroke. With fast commissioning, programming and simple use of an intelligent servo gripper due to the ‘Plug and Work’ starter package, the Schunk EGH Co-act gripper offers optionally attachable flexible fingers for increased flexibility. This also increases the gripper’s range of application.

More info: www.gb.schunk.com
Intertronics launches precision microdispensing system for jetting liquids and pastes

Adhesives specialist Intertronics now supplies the Vermes Microdispensing System (MDS) 1560, an easy-to-use, cost effective jetting valve for a wide range of viscosities, including solder pastes. The product is based on Dynamic Shockwave Technology (DST), a revolutionary pneumatic actuator technology, which optimises the valve’s yield to achieve more precise dispensing. Able to dispense very small amounts in rapid succession, the consistent actuation power delivers high precision, even at the smallest dispense stroke. The Vermes MDS 1560 dispenses small volumes of material at fast speeds with accuracy and repeatability, including onto 3D surfaces. It offers a high clock frequency (around 500Hz) and dispensed shot sizes down to around 1nl.

MORE INFORMATION: www.intertronics.co.uk

SKF reveals Silent Series ball bearings for spindles

The Silent Series super-precision angular contact ball bearings have been developed in direct response to key issues faced by manufacturers of machine tool spindles. They identified that minimising noise and vibration levels during operation was key to improving confidence in the performance of their spindles. Bearing cages in lower-speed spindles can make rattling noises during rotation. This is normal, but can be mistaken for a sign that something is wrong with the spindle or its components. Rudolf Groszmayr, product line manager at SKF says: “The SKF Silent Series feature a new and innovative polyamide cage centred on the balls that minimises this ‘cage rattling’ during rotation. Their silent operation increases the confidence of the end-user in the quality of spindles.”

MORE INFORMATION: www.skf.com

Size 6 brushless slotted DC motors for arthroscopic applications

Motors for arthroscopic applications need to be tightly packaged and offer minimal vibration to achieve lightweight, ergonomic designs – a challenge answered by the latest cannulated Brushless DC motors from Portescap. The release of three new cannulated surgical motors for arthroscopic applications offers engineers a solution with low vibration, high efficiency and a proven ability to withstand 1,000+ sterilisation cycles – as well as exposure to saline and other foreign materials. The new Portescap motors are lightweight with low noise and vibration to maximise tactile response and surgeon control in the most delicate of surgeries.

MORE INFORMATION: www.portescap.com
The best kept secret in Linear motion and positioning

NIPPON THOMPSON CO. LTD IS A SPECIALIST IN MANUFACTURE AND SALES OF PRECISION POSITIONING TABLES, NEEDLE BEARINGS AND LINEAR MOTION GUIDES

Precision positioning tables
The Mechatronics Series was developed through the integration of precision machining technology and electronics. Precision positioning tables (commonly known as PPT in the UK) incorporate a linear motion rolling guide and ball screw or linear motor between the bed and slide table.

A wide range of products are available in either the module type or super high-precision type. They play an important role in a variety of industries that require equipment with positioning mechanisms such as semiconductor manufacturing equipment, flat panel display manufacturing equipment, and other precision equipment needs. Having the precision positioning table in place helps reduce assembly time.

Ball screw driven units
TU Series is a compact and slim type positioning table, consisting of a U-shaped track rail and a slide table. The slide table, assembled inside the U-shaped track rail, is an integral part of a linear motion rolling guide mechanism, in which two rows of large diameter steel balls are arranged in four point contact with raceways. Owing to this design, stable high accuracy and high rigidity are obtained in operations even under fluctuating load varying in direction and magnitude, and complex load. Also, by adopting a U-shaped track rail, the rigidity of track rail under moment load and torsion is greatly improved.

TU Series includes six sizes with a track rail width of 25mm to 130mm. For each of them, slide table length can be selected. Also, ball screw types and leads, motor types, and sensor installations, etc, can be selected to obtain an optimum positioning table suitable for each application.

TE Series is a lightweight and compact positioning table using high-strength aluminium alloy for its main components, with a slide table assembled inside a U-shaped bed. A precision ball screw is used for the feeding mechanism, enabling high-reliability and high-precision positioning. Lubrication part C-Lube is built into the linear motion rolling guide and ball screw, achieving long term maintenance free performance and reducing lubrication work. Various specifications such as ball screw lead, motor type and sensor mounting can be configured, enabling the optimum positioning table to be configured according to the application. It is ideal for a wide range of applications ranging from equipment that requires high positioning accuracy such as parts machining, assembly, inspection and conveying equipment through general conveying fields.

TC—E Series is optimal for use in high cleanliness environments for semiconductor and LCD manufacturing machines. The unique high-airtight structure seals the driving part and guiding parts of the slide table, and prevents dust generation around the table. IKO Cleanroom Precision Positioning Table TC—E achieves cleanliness class 3 by enhancing the airtightness inside the table.

TM Series is an extremely compact precision positioning table incorporating a precision ground ball screw with a thread diameter of 2mm, pitch down to 0.5mm, and an IKO Micro Linear Way L with a track rail width of 2mm, well-established in the field of ultra-small equipment.

Linear motion tables
LT Series are lightweight, direct drive positioning mechanisms with low sectional heights. An AC servomotor and miniature optical linear scale are integrated within a high-strength aluminium table and bed to achieve fast acceleration and highly responsive positioning.

A C-shaped magnet yoke set between two stator magnets, along with a high-density coil, enable up to 20G acceleration and deceleration, and a driving force of 150 to 900N for fast, precise motion. The three styles of the LT series are: compact (CE), long stroke (LD) and high thrust (H). Built-in C-Lube lubrication units guarantee long life and maintenance-free operation for five years or 20,000km.

Nano Linear Tables or NT table are ultra-compact positioning mechanisms featuring linear motors and high-resolution encoders for accurate and responsive motion, and high-carbon steel tables and beds for extra stability. High-performance neodymium magnets enable maximum thrust of 70N in a tiny package. Applications include semiconductor equipment, inspection instruments and assembly equipment that require clean environments. The four styles of NT are Standard models (NT…V), High Accuracy models (NT…H), Pick and Place models (NT…XZ), and High Thrust Pick and Place models (NT…XZH). Built-in C-Lube lubrication units guarantee long life and maintenance-free operation for five years or 20,000 km.

ABOUT NIPPON THOMPSON
Since becoming Japan’s first manufacturer of needle roller bearings in 1959, Nippon Thompson has established a world-class reputation as an innovative producer of high-quality, precision bearing products. Using their expertise and technology through years of experience producing needle roller bearings, they have developed a line of motion rolling guides that combine carriages and track rails.

Since the introduction of their first linear motion rolling unit, or Linear Way, in 1978 these products have become important components of industrial robots, numerically controlled machine tools and other sophisticated equipment used in the semiconductor industry. Especially for these highly demanding applications, Nippon Thompson developed a wide range of products made in stainless steel and fitted with special lubrication, suitable for cleanroom environments.

MORE INFORMATION: www.iko.co.uk • sales@iko.co.uk • Tel: 01908 566144

January 2020 • INDUSTRIAL TECHNOLOGY
THIN SECTION BEARINGS

MIKE PAGE EXPLAINS WHY THIN SECTION BEARINGS SHOULD BE ON EVERY DESIGN ENGINEER’S RADAR WHERE SPACE IS TIGHT, WEIGHT SAVING IS REQUIRED AND WHERE TOLERANCES ARE EXTREME

Thin section bearings offer design engineers a unique combination of advantages in a single, hard wearing and lightweight package. As the name implies, they are significantly thinner in section than ‘ordinary’ rotating bearings and possess attributes that make them very different from ordinary radial bearings. One of the most important (and useful) of these is that whereas most radial bearings are designed so that the bearing thickness increases proportionately as the bore size gets bigger, in the case of thin-section bearings, the thickness remains fixed even though the bore size increases.

Generally, thin-section bearings are specified for use in critical applications and environments where space is tight, weight must be minimised and absolute precision. In these types of application, thin section bearings have helped to reduce the total cost in a system by allowing for design efficiency over standard bearing sizes, with the added advantage of using just a single bearing which shows little change in its weight even as its diameter increases.

Speaking of weight saving, the advantages offered by thin-section bearings in this respect can be substantial. For example, on a bearing with a bore of 100mm, a thin-section bearing might weigh 1kg less than a standard option. And on a larger bearing with a bore of around 900mm the weight saving could be in the region of 400kg. Serious numbers.

Thin section bearings can be manufactured in a variety of materials, with 52100 vacuum-gassed chrome steel and 440C martensitic stainless steel being amongst the most popularly specified, although 17-4PH and M50 tool steel can also be specified. As with many other types of bearing, thin-section bearings can also be specified with a variety of specialist coatings if required. Examples include thin-dense chrome which helps to extend service life, delivers even smoother running and assists in combating corrosion.

Designers can choose between three definitive types of thin-section bearing, dependent upon their application requirements, with each of them delivering a different set of advantages. Radial contact by the balls may be preferred for some uses, whereas the alternatives of either angular or four-point contact might be preferred for others. Likewise, designers can make choices regarding ball types (including ceramic balls) together with different cage designs, alternative materials options and a variety of lubrication choices. On some thin-section bearings, special seals and/or retainers can be manufactured too.

The combination of thin-section size preferences, the various materials choices, finishing processes and roller-contact types and materials are all vital elements in early discussions on the sort of projects in which these bearings excel.

Lubrication considerations

As with all bearings, lubrication is an essential element that should be considered in advance, and OEMs invariably choose one of the three lubricant types which are most commonly used: oil, grease, and dry film or surface treatment. Oil normally provides better lubrication than grease or solid lubricants, as it covers critical surfaces more thoroughly and dissipates heat more rapidly, whereas grease is clearly more easily retained, allowing the use of simplified bearing housings and seals.

It should be noted that in addition to ‘standard’ lubricating oils and greases, leading thin-section bearing manufacturers can also offer vacuum-compatible oils and greases, as well as dry film lubricants alluded to previously, including graphite, tungsten disulphide, silver, lead, PTFE and molybdenum disulphide to assure lengthy and trouble-free thin-section bearing service life.

Coping with undesirable loads

Unwanted moment loads can be the design engineer’s enemy, and in the combating of unwanted axial or radial loads, thin-section bearings have been proven to excel, partly because they are designed from the outset to cope with it. Project designs which are expected to generate significant moment loads but which also have critical space and weight-saving requirements (to say nothing of the need for cost-reduction) often see the maximum benefit from the use of a single, thin-section bearing rather than paired standard bearings. This is because the thin-section design delivers inherent resistance to moment load, so the lifespan of a critical bearing can be greatly enhanced if a thin-section type is deemed suitable.

Author: Mike Page is sales manager at Carter Manufacturing

MORE INFORMATION: www.carterbearings.co.uk • sales@carterbearings.co.uk • Tel: 01865 821720

Industrial Technology • January 2020
To help designers ensure that the correct types and versions of bearings are specified, those available in the Silverthin range from Carter Bearings come in three different designs. The C-Type is a radial contact type. It has a single row of balls which allows for Conrad-type assembly, widely recognised for its ability to resist radial loads whilst withstanding moderate axial and reversing loads.

The A-Type is an angular contact type thin-section bearing with a reduced shoulder on one side of the inner or outer race ball path to assist the bearing in accommodating both radial and single-direction thrust loads. The A-Type of bearing requires an application of thrust to establish the appropriate race and ball contact angle, and is commonly used in a pair.

The X-Type is a 4-point contact bearing designed for use where a high level of rigidity is required. This type of thin-section bearing can accept radial and thrust loads in either direction and has proven to be extremely effective in applications where very high moment loads are present. X-Type bearings are designed with ‘gothic arch’ shaped raceways which create four contact points between each ball and the raceway.

Preloading can provide additional precision and rigidity of movement if desired, and in some applications a single X-Type bearing may be used to replace two standard thin section bearings to deliver the joint advantage of the required performance coupled with an extremely low installed deck height. It should be noted however, that X-Type thin section bearings are not always the best solution when used in low-torque or high-speed applications.
I n early 2015 an East German StartUp, AIM3D set out to revolutionise the 3D printing world by creating a 3D printing machine that would offer the potential to eventually become a standard tool on every workbench. One unexpected challenge in this quest to develop a flexible and economically efficient 3D printing machine was finding a suitable provider of a high quality linear guidance system that would fit their needs.

The founders of AIM3D aimed to drastically reduce the cost of the additive manufacturing of metal parts. In their experience, the widespread use of additive manufacturing had so far failed because of high material and machine costs. Many 3D printers only accommodate a single material and often rely on expensive materials for printing. “It was our ambition to create ‘the’ machine tool of the 21st century that has a place in any company, much like a lathe or milling centre in the 19th century,” says Robert Radon, head of development for mechatronics.

“Hepco’s slimline bearings and the NV20 slide from our GV3 linear guide system was the best solution,” adds Zielke who was involved in the printer’s development right from the start. While the AIM3D engineers aimed at drastically reducing the cost of additive manufacturing, they did not want to do so by compromising on quality. However, finding this combination of features at an acceptable price proved more challenging than expected. They looked at a number of providers for linear solution guidance systems but nothing quite satisfied their high demands until they came across HepcoMotion.

The prototypes have been well received, particularly with a sample we could experiment with, something we did not expect as we are not yet a bulk buyer.”

It took two years of development work to complete the ExAm 255 but now AIM3D is ready to move into serial production and is awaiting the patent for its CEM E-1 Extruder print heads. The printer can process almost any injection-moulded granulate up to a diameter of 3mm. “The really special thing about the E-1 Extruder is that the customer does not have to purchase expensive polymer filaments or metal powders,” explains Radon.

The ability to use standard injection granules makes the process a lot less expensive. Additionally, the same material can be used for prototypes and final manufacture, making the transition from prototype to finished product more economical and faster for the end user. “In my opinion, we are the only company so far to have developed such a universally employable 3D printer,” concludes Zielke.

The prototypes have been well received, particularly from the automotive industry where glass-fibre filled plastics are commonly used. In this industry, margins are low and there is a constant need to adapt. Here we have a 3D printer that no longer relies on its own ecosystem, but works with readily available, standardised materials and tools.
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Motors on test

**DY NAMIC MOTOR TEST IS IMPROVING EQUIPMENT RELIABILITY FOR EDF ENERGY AT HARTLEPOOL POWER STATION**

Opened in 1983, Hartlepool power station in County Durham is one of seven UK nuclear power stations built using two Advanced Gas Cooled Reactors (AGR). Owned and run today by EDF Energy, the 1,185MW plant is scheduled to continue operating until 2024.

Hartlepool currently provides around 2% of the UK’s peak power demand, so its safe, reliable ongoing operation is critical not just to the bottom line of its owner, but also to the stability of the country’s energy supply. The plant’s staff are always looking for ways to improve its operations, with a focus on three key performance indicators around safety, output and maintaining availability until the end of its planned operating life.

One recent innovation in that continuous improvement effort has been the introduction of a new approach that allows EDF to assess the operating condition of essential, but inaccessible equipment. That approach relies on dynamic motor analysis technology from SKF. The company initially developed its new condition monitoring technique to improve the reliability of a specific piece of equipment in the plant’s refuelling system. A single fuelling machine is used to refuel and exchange control rods on both reactors as well as transfer the items between various maintenance facilities.

**Fuel assemblies**

In the AGR, fuel assemblies, comprising fuel and a carrier plug unit, are transported by the fuelling machine and raised/lowered at the reactor. Spent fuel assemblies are removed from the reactor by the same machine and transported through a series of cooling and disassembly operations.

A key part of the fuelling machine operation is a special plug that seals the reactor when the spent fuel is removed, protecting operators and the environment from radiation, that plug is moved by a 4m long lead screw. When the lead screw eventually wears out, replacement is a costly and time-consuming operation, requiring two six-person maintenance teams working on a 24-hour rotation for 14 days.

Regular maintenance and lubrication extends the life of the lead screw, but since even that requires eight hours of effort with the machine shut down, the power station’s engineers wanted a way to optimise maintenance intervals, balancing overall availability with service life. Conventional condition monitoring equipment could not be installed on the lead screw, due to its inaccessible position behind the plant’s radiation shielding.

The drive motor that operates the lead screw is accessible during machine operation, however, so the team looked for a way to use the performance and behaviour of the motor to infer information about the condition of the mechanism. Their answer came from the SKF Dynamic Motor Analyzer EXP4000. The EXP4000 is normally used to assess the condition of electric motors by analysing the motor and current while in operation, but the system can also estimate the torque delivered by a motor from voltage, current and speed data.

For their application, the Hartlepool team permanently installed an SKF Dynamic Motor Link EP1000 within the motor control cabinet. This module allows for the quick and safe connection of the EP4000 to measure the voltage and current signals via a low voltage plug mounted on the control panel door.

The team established a baseline torque profile by measuring the performance of a recently overhauled lead screw while the machine was in operation. Those measurements are repeated periodically and compared with the baseline figures to identify any significant increase in torque that might indicate a need to lubricate the screw. With that early warning, the plant’s operations team can schedule the appropriate maintenance at a time that fits in with the overall fuelling programme.

“Since the installation of the SKF equipment, the condition based maintenance approach has helped us operate the fuelling machine with considerably improved reliability,” says Grant Milwain, fuel route system engineer at EDF Hartlepool. “That means less downtime and unplanned maintenance and ensures we achieve our planned refuelling schedules.”

The success of the project has encouraged Hartlepool’s sister station, Heysham 1 in Lancashire, to adopt the same approach on its own fuelling machine. At Hartlepool, meanwhile, engineers are extending dynamic motor condition monitoring using the SKF EP4000 to a variety of other equipment, including boiler feed and cooling water pumps.

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January 2020 • INDUSTRIAL TECHNOLOGY
Rockwell saves costs and simplifies sizing with new servo system

The growing consumer desire for more product variety and packaging sizes is creating a need for smaller, more flexible machines. To provide a more cost-effective option for OEMs building smaller machines, Rockwell Automation is introducing a new Kinetix 5100 servo drive, Kinetix TLP motor and cable that can function as a system without a controller. The Allen-Bradley Kinetix 5100 servo drive has multiple control modes available to support a wider range of high-speed, low-power motion control applications. The drive can be used with a Micro800 controller, a Logix controller or even by itself.

MORE INFORMATION: www.rockwellautomation.com

First decentralised IP66 frequency inverter with IO-Link from Lenze

Lenze’s i550 protec inverter range has been designed for decentralised drive tasks and comes with IP66 protection class, IO-Link connectivity and a power range of up to 75 kW. Lenze says it is the first of its kind to offer this level of communication integration for decentralised applications, making it ideal for use with conveyors, fans, pumps and lifting units. Thanks to the inclusion of the IO-Link V1.1 standard interface, sensors and actuators distributed throughout an application can now be linked to a centralised control system using the new i550 protec.

MORE INFORMATION: www.lenze.com

Innovative hollow shaft rotary actuators

JVL’s HLMT series hollow shaft rotary actuators take a novel approach to decentralised precision positioning tasks on rotary tables and automated machines where a through aperture is required for routing services or maintaining a clear line of site. Available in the UK from McIlvan, the design features an offset motor mounting in five model variants with clear through-hole diameters from 20 to 30mm and rated torque output of 5 to 142Nm. The actuators are used with JVL’s MAC motor and ServoStep integrated servo and stepper motors or with other manufacturers motors in NEMA 17, 23 and 34 frame sizes.

MORE INFORMATION: www.mcilvann.co.uk

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MORE INFORMATION: www.lenze.com
PAUL TAYLOR LOOKS AT SOME OF THE IMPACTS OF BREXIT ON MACHINE BUILDERS

If you are the project manager that is responsible for machinery building and safety, it's vital that you have an understanding of how Brexit will impact your role. The good news is that after Brexit, the actual process for manufacturing compliant products will have little effect from a legal perspective as the UK will operate a regulatory regime that is separate from the EU – just like the rest of the world.

As the EU Directives are transposed into National Law, the UK already has a legal system in place that applies. There will of course be text amendments to reflect UK legislative requirements, including the UKCA mark and removal of references to EU directives and the CE marking. While references to ‘harmonised standards’ will change to ‘designated standards’, the actual standards will remain the same as EU harmonised standards, and will be carried across as UK designated standards to maintain a single model, and all products will still need to comply with the essential requirements. However, while the UK remains in the EU, the new UKCA mark for the UK cannot be applied.

Under the current proposal for the UKCA mark, existing UK-based notified bodies will become UK Approved Bodies. So, their actual function will remain the same but under a different title. Meanwhile, all relevant certificates that have already been issued for EU Directives before Brexit, such as Radio Equipment, Machinery and Marine Equipment, will remain valid beyond Brexit.

Project management practicalities

When the Provision and Use of Work Equipment Regulations (PUWER) first came into force in 1992 it included a very simplistic view on CE marking as the end user only had to check that the equipment concerned carried a CE Mark. If it did, they were able to presume conformity. PUWER was updated in 1998 and one of the more important but easily overlooked changes was that the onus was now put on the end-user to make sure that the equipment complies with all relevant legislation such as CE marking. These changes were re-enforced with further changes in June 2002.

When building machines, or when combining machines to produce an assembly of machines, it is easy to get things wrong and end up with a project that requires a lot of rework and ends up going over budget or overtime. To this end, it is vital to ensure that the CE/UKCA marking is considered from the start. If this isn't done, common problems that occur include:

- Equipment being installed before a final layout is agreed so that machines have to be moved and rework is required.
- Consideration not given to a safety related control system at the start leads to a number of problems when linking different machines with different performance levels.
- Not considering control system functionality so that feed conveyors are not stopped when a process is stopped, resulting in damaged products at best and injury at worst.
- Machinery that is not inspected before installation subsequently reveal non-compliances, resulting in disagreements about who pays to put it right - the supplier, the contractor or the user.
- Control colours not being agreed means that different suppliers may use different colours, leading to confusion. The European Standard allows for green, white, black or grey for 'start' and red, white, black or grey for 'stop', so even if the supply chain complies with the standard, errors and confusion can occur.

Equipment is often designed and installed with no thought as to what happens either upstream or downstream, or who takes the responsibility for which parts, and who takes responsibility for the final assembly. This can be exacerbated when equipment is sourced from outside the European Economic Area, or existing equipment is linked to new equipment.

When starting a project, it is therefore vital to decide who is going to take the responsibility for the CE/UKCA marking and lay down the ground rules. Decide what Performance Level the machine will come under, using EN ISO 13849 and ensure all suppliers are aware of what is required. Make sure they all understand which EN Standards to follow, and that they have copies of the Standards. A good tip is to ask for sample declarations before deciding on suppliers, so that you can check to see if they contain the correct information.

When you issue purchase orders, ensure there is a clause about CE/UKCA marking which states whose responsibility it is. A solution to this is to use a User Requirement Specification (URS) when purchasing new equipment, which will outline your requirements for the equipment supplier. A URS should include statements such as:

- The machine must comply with all applicable European and UK legislation (list all applicable directives)
- Euro-norm standards should be used to achieve compliance with the essential safety requirements of all applicable directives
- Documentary evidence demonstrating compliance with all applicable directives will be required
- A Declaration of Conformity will be required
- A CE/UKCA marking will be applied to the machine, preferably on the manufacturer’s nameplate
- A full operation and maintenance manual that complies with EHSR 1.7.4 of the Machinery Directive will be required

Before accepting and paying for any machines, check that they meet the requirements of the order and also that they conform to the Machinery Directive. A pre-purchase audit is a useful system that can help machinery buyers ensure that equipment is both safe and correct.

MORE INFORMATION: www.tuv-sud.co.uk • info@tuv-sud.co.uk • Tel: 01489 558100
The efficient and optimised use of electricity generated from renewable energies calls for an appropriate form of storage. In the recently developed EnWheel flywheel energy storage units from German company Stornetic, Combivert F6 drive controllers from KEB control the energy flow together with specially developed sine-wave filters.

Leitmarkt Agentur NRW achieved this with the help of the EU-funded Quirinus project, which focuses on developing sustainable security of supply. This is ensured by high and efficient system stability in increasingly decentralised generation plants that feed their power into the grid on a fluctuating basis. The surplus energy is stored in electrochemical storage systems (Li-Ion or SuperCap) or as kinetic energy in flywheels. These forms of storage are particularly attractive in order to absorb peak loads and therefore keep the supply network constant. Flywheel energy storage units are particularly suitable for ensuring consistent capacity over many charge and discharge cycles. Stornetic develops and produces storage systems of this kind with DuraStor.

In the event of an energy surplus, the EnWheel accelerates an actively magnetically mounted carbon-fibre rotor up to 45,000 revolutions per minute. The drive is disabled for interim storage of rotational energy (Idle mode). As the rotor rotates freely in a vacuum, there are virtually zero friction losses. If energy is required, the drive synchronises to the rotating rotor and feeds the ‘braking energy’ back into the network.

In addition to shutdown and synchronisation on the rotating rotor, the cooling of the motor with low heat transfer in the vacuum is one of the particular challenges. In the new generation of flywheel energy storage units, KEB Combivert F6 drive controllers function in combination with specially developed sine-wave filters to control the energy flows in the flywheel energy storage units. The efficiency optimisation in the overall system is based on an ideally tailored package consisting of a drive controller, sine-wave filter and synchronous motor in the EnWheel with minimised harmonic content (THD) and therefore the lowest electrical losses on the rotor side of the drive.

The ‘Speed Search’ function, which is further optimised by its use in the F6 drive controller, is responsible for the load application and release of the flywheel rotor in Idle mode, which ensures an immediate connection to the rotating rotor up to maximum speed. Due to the possible load release in Idle mode, the complete switching losses of the IGBTs in the drive controller are eliminated for yet another contribution to better energy utilisation.

Fields of application are increasingly created by the concept of “microgrids” to compensate for peak loads and thus the stabilisation of local grids. The solution offers a number of benefits:

- System solution with drive controller and sine-wave filter for THD values less than 1.5%
- Idle Mode via Speed Search function up to 45,000 revolutions per minute.
- Operation of the motor with optimised switching frequency at output frequencies up to 750Hz.
- Optimum overall efficiency.
- Fast response times and high power gradients without diminishing performance over the entire service life of the system.

With this and other successful projects in the renewables sector, KEB has demonstrated its value as a successful partner and influential supplier with the knowledge, experience and breadth of products to help companies overcome their application challenges.

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8 WAYS TO WRECK YOUR COUPLING DRIVEN SYSTEM

Keeping a servo driven system running at peak efficiency is no simple feat. Misunderstanding performance criteria such as misalignment, torque or RPM can be all it takes to cause a critical and costly failure. The following are the 8 best ways to consistently sabotage or damage your coupling driven system, and how to avoid them in the future.

1. Choosing the wrong coupling: Unsurprisingly, one of the most effective and common ways to wreck your system is by selecting the wrong coupling. There are many factors a design engineer must keep in mind to avoid coupling failure. Balancing criteria such as torque, RPM, shaft size, tolerances, operating environment, and misalignment is paramount to selecting the right coupling.

2. Not identifying misalignment: Most servo applications have one or more forms of misalignment. This is a primary concern, since misalignment can cause stress to system components such as bearings, not just to the coupling itself. Misalignment is often caused by a tolerance mismatch from the driving side of a system to the driven side. This can be caused by a variety of factors, including parts from different manufacturers, inaccuracies in assembly, system/motor movement during operation, system component wear, poor mounts, and thermal shaft expansion. Each coupling style can accommodate different amounts of misalignment. Designers must understand the nature of existing misalignment to determine if a high misalignment coupling is needed at the expense of factors such as torque, or if corrective system adjustments are necessary before selecting a coupling.

3. Exceeding RPM recommendation: System requirements determine speed and in precision driven servo systems it is possible to have speeds of even 25,000 RPMs. Unfortunately, not every coupling can handle higher speeds, even if they are otherwise a perfect fit for the system. Exceeding the manufacturer’s RPM rating can cause coupling failure or damage to system components. Even if the coupling is rated for high RPMs, greater speeds increase the effects of misalignment. A disc coupling might accommodate very slight angular misalignment at its maximum rated speed of 10,000 RPM without adverse effects on the coupling or system components but will cause damage at a speed of 15,000 RPM.

Designers must know the maximum operating speed the coupling will experience to select the right one. It is also important to understand how manufacturers determine ratings – with performance factors in isolation or everything at maximum.

4. Not considering coupling wear: Couplings are designed to be the wear element in most systems to protect more expensive components such as bearings and motors. Each coupling wears differently and will fail in a different way. Beam and bellows couplings will completely fail stopping power transmission when they reach the end of their service life. Disc, jaw, and oldham couplings will lose zero-backlash, but still transmit motion. Depending on the application requirements one of these wear types may not be desirable.

Additionally, designers must consider if the coupling requires maintenance when reaching the end of its service life. Beam, bellows, and disc couplings are maintenance free and require complete replacement after a failure whereas oldham and jaw coupling performance can be restored by replacing the insert after failure.

5. Installing the coupling incorrectly: There is no faster way to undo the work of selecting the perfect coupling and optimizing system parameters than installing it incorrectly. For example, uneven torqueing of the screws, incorrect shaft penetration, installing off-center and compressing or stretching the coupling can lead to a failure or premature wear of sensitive system components. The safest option is to follow the manufacturer installation instructions, especially when accompanied by videos.

6. Buying generic couplings: Not all couplings are created equal, or for the same purposes. Some couplings are manufactured with common specifications, tolerances, and designs, such that they are nearly indistinguishable from many others on the market. This may be suitable for systems with limited performance requirements, but precision systems often require or benefit from couplings with additional capabilities. For example, balanced designs are not the industry standard for most couplings.

In an application like printing the reduced vibration afforded by a balanced design is a necessity – less precise couplings would cause banding and expensive waste or downtime.

7. Selecting the coupling late in the design process: Far too often motion control couplings are selected late in the design process. This can limit which coupling is used in the system and the performance it delivers. For example, a system requiring high torque and speed may need to use a disc coupling but ultimately have an envelope that is too small to fit a double disc type, forcing the designer to select a single disc type.

While it may meet the speed and torque requirements, single disc couplings cannot accommodate parallel misalignment, meaning that the system will require greater precision during installation to eliminate the chance of parallel misalignment, likely adding cost and complication. Considering the coupling earlier in the design process would have likely eliminated this issue, saving time and money. To make the design process easier, manufacturers may have CAD, detailed product information, and technical support available on their website.

8. Failing to test: One of the first rules of system design is always test. While everything may look correct in the design, it is hard to determine suitability until the coupling is run under common use conditions. Extensive testing prior to use in live systems can help maximise coupling and system performance. Manufacturers can assist in the design process with technical support and by providing product samples to ensure proper coupling selection.

Author Robert Watkins is vice president of sales and applications at Ruland Manufacturing.

MORE INFORMATION: (UK distributor) www.acorn-ind.co.uk • sales@acorn-ind.co.uk • Tel: 0800 8766 441
Warner Electric has released a new range of pre-assembled electromagnetic brakes that offer superior performance for stopping and parking applications. The brakes can be specified in standard, high-torque or high-speed configurations and with a selection of accessories included.

As standard, the ERX brakes provide braking torque from 5 up to 60N m. The high-torque option increases braking torque to 75N m and the high-speed version facilitates between 3,500 rpm (60N m) to 7,000 rpm (5N m).

All of the brakes are supplied with ‘non-stick’ friction material that has been developed by Warner Electric to stop brakes from seizing whilst closed. For automated processes where brakes are only applied occasionally, yet must be relied upon at a moment’s notice, this is of particular importance. The five optional features allow customers to specify a hand lever for manual release; an IP54 protection kit; a double brake with two magnets and two friction discs for full redundancy; a ‘silent option’ – better than 55dB(A); and the Warner Electric Sensor (WES) – a contactless solution to monitor the position of the armature and provide feedback on wear.

Complementing the smart design of the ERX range, Warner Electric has developed an easy-to-use configurator that allows engineers and purchasers to reliably order the part they want. And Warner Electric is able to offer thousands of variations on short lead times.

MORE INFO: www.warnerelectric-eu.com
Omron has launched the sixth wave of its factory automation control devices built on a common design platform for further innovation in control panel building. The new products include 237 models, including J7KC, J7TC, J7MC, J7KCA and J7KCR series low voltage switchgear (LVSG), S8V-CP series DC electronic circuit protectors, and PTF-XX-PU socket for LY relays with Push-In Plus technology. Omron’s ‘Panel Solution’ programme provides a unified design and size for control panel equipment, together with the company’s proprietary wiring method, screw less Push-In Plus technology.

MORE INFORMATION: www.industrial.omron.com

Siemens Startdrive V16 brings new functions to the TIA portal

Siemens says its Sinamics Startdrive commissioning software is the perfect tool for integrating drive hardware into the TIA Portal engineering framework. With the latest version Sinamics Startdrive V16, Siemens is expanding the hardware portfolio available on the automation platform. Following on from the integration of the Sinamics S120 multi-axis system, the single-axis version of this high-end servo drive system can now also be engineered in the TIA Portal. The drive control of the recently introduced Simatic Drive Controller is now also integrated in the commissioning tool. Drive-CliQ hubs are now integrated in the TIA Portal, perfectly completing this hardware update.

MORE INFORMATION: www.siemens.com/startdrive

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MORE INFORMATION: www.brainboxes.com

Omron completes panel solutions line-up with 237 new models

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MORE INFORMATION: www.industrial.omron.com

Applying tools to harness the Internet of Things

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The ultra-compact Sick nanoScan3 is just eight centimetres tall, so it can fit snugly into the spaces in machines where safety laser scanners could not previously have been located. Packing in all of Sick’s latest safety laser scanning technology advances, the nanoScan3 enables the highest level of responsiveness when safely adjusting a machine’s speed and direction.

The Sick nanoScan3 features a full suite of programmable features such as multiple, dynamically adapting protective fields and contour detection. With Sick’s innovative safeHDDM (High Definition Distance Measurement) scanning and evaluation technology onboard, the nanoScan3 promises maximum reliability with the option of precise data output for use in navigation, even under difficult conditions such as bright lights, sparks, dust and dirt.

Measuring just 101x101x80mm, the nanoScan3 is also suitable for integration into stationary plant and infrastructure for hazardous point, area and access protection applications, as well offering opportunities for retrofitting into contour- or tape-guided mobile vehicles.

A range of safe communication options over standard interfaces allows for easy configuration and diagnostics to be performed on the device or over the network, with minimal cabling. The Sick nanoScan3 is a Type 3 device (EN 61496-3) and can be used in safety functions up to SIL2 (EN 62061) and PLd (EN ISO 13849).

“The nanoScan3 is a safety designer’s dream in miniature form, opening the field for integrating safety laser scanners in all types of small-space applications with easy and economy,” comments Dr Martin Kidman, Sick’s UK product manager for machinery safety. “The nanoScan3 Core and the nanoScan3 Pro models offer a range of features to allow designers, integrators and end-users to incorporate safety laser scanning into existing equipment and systems, where they would not previously have fitted, as well as offering compact build possibilities for new equipment design.”

The Sick nanoScan3 features a protective field range of three metres, with a scanning angle of 275°. The device offers a choice of eight (Core) or up to 128 (Pro) freely-configurable fields, including navigation data and contour-detection fields. More than 100 events can be stored and analysed, helping to optimise the configuration and avoid unscheduled machine downtime. LEDs and clear text displays provide instant operational status viewing from nearly any direction.

Sick’s Safety Designer software enables step-by-step configuration, as well as access to detailed diagnostic information. When the nanoScan3 is combined with Sick’s FlexiSoft Safety Controller, Safety Designer ensures only one configuration and diagnostic tool is needed for the control of safety laser scanners and plant-wide safety systems.

Sick nanoScan3 connectivity includes micro USB for local configuration and diagnostics with an Ethernet interface for central configuration and real-time precision data evaluation, as well as storage of configuration information for easy device replacement. Safe local I/O options enable easy and flexible integration with different controls including HTL encoders.

ABOUT SICK

Founded in 1946, Sick now has over 50 subsidiaries and equity investments, as well as numerous agencies around the world. In the 2018 fiscal year, Sick had almost 10,000 employees worldwide and a group revenue of around €1.6 billion. Sick (UK) Ltd is based in St Albans, Hertfordshire and has been the UK subsidiary of Sick AG (Germany) since 1973. The company has a wide network of sales engineers, service engineers, distributors and resellers throughout the UK and Ireland.

As an experienced system partner for many major projects, Sick not only offers a wide range of leading edge products, but also a comprehensive package of vital know-how, service and support. You will find Sick products in daily use throughout industry, serving the widest imaginable range of applications in all sectors.

Continuous product innovations in all areas of automation means that Sick is in the enviable position of being able to offer the right product for your application. The company is a specialist in helping customers to achieve their optimum process and supply goals.

For further insight into Sick safety equipment, this time in a robotics application context, see page 32.
BRITISH COMPANY MECHAN CONTROLS IS LOOKING TO BE THE FIRST NAME IN MACHINERY SAFETY ON THE GLOBAL MARKET. MARK SIMMS SPOKE TO MANAGING DIRECTOR MABRUK FARRAH

The growing demand for reliability and efficiency in the modern production environment has led to an evolving need for new and innovative machine guarding strategies. Mechan Controls has set out its stall not simply to meet these requirements, but to be the leading British manufacturer of such products.

Managing director Mabruk Farrah is also the owner of Mechan Controls, having acquired the company in 2017. He saw for the business an opportunity to drive its growth by focusing firstly on high performance, high reliability products, but also by targeting overseas markets where the 'made in Britain' tag is regarded as the ultimate badge of quality.

Formerly technical director at the company, and responsible over the years for the development of many of Mechan Controls' products, Farrah is now expanding the product portfolio, with the goal of making the company the number one choice for machine safety guard products.

"We’re moving the company to the next level," he says. "All the products are designed and manufactured in the UK, and we’re flying the British flag by focusing on performance, quality and reliability."

Mechan Controls has been a leading player in machine guarding since the development and manufacture in 1972 of its first non-contact safety switches for the harsh conditions of the can making industry. Today from its base in Skelmersdale, Mechan Controls manufactures a wide range of non-contact safety switches, mechanical interlocks, light curtains and safety relays to suit most machine guarding requirements. Whether you have a low or high-risk application, the extensive range of products fulfils the latest requirements set out in the international safety standards. The range caters for non-locking, locking and non-guarded areas of machines. This means you can rely on these products for a number of applications, ensuring the correct guarding is used to maximise productivity and, more importantly, protect its users.

New products launched this year include the MLG-Serie of Type 4 and multi-beam light curtains for production line safety and perimeter guarding. Robust enough to be used in even the harshest conditions, they are available in heights from 200mm to 1800mm, and offer finger, hand and body protection. Applications include presses, packing machines, carton gluers, robot assembly cells and welding cells.

Compact and rugged
"These high quality light curtains represent the culmination of our combined 40+ years' experience in the design and manufacture of machine guard safety products," says Farrah. "Compact and rugged, they also incorporate a diagnostics display.

Also new is the Proton range of uniquely coded OSSD RFID solenoid interlocks, designed to safeguard areas that require guard locking during operation or during rundown periods. The uniquely coded (4 billion codes) RFID actuator provides a high level of coding according to EN14119, with a design that fulfils PL-e safety requirements when the units are connected in series.

The ball style actuator has been designed to be tolerant to high misalignment, self-centring itself upon actuation. The robust design has been tested to hold

THE UK, AND WE’RE FLYING THE BRITISH FLAG BY FOCUSING ON PERFORMANCE, QUALITY AND RELIABILITY

KEEPING THE FLAPS CLOSED

Some fundamental framework conditions had changed shortly before the delivery date, so the safety concept for a horizontal mixer had to be adapted as quickly as possible. Within a few days, Pilz worked with special purpose machinery manufacturer Herbst to incorporate the safety gate system PSENmlock, which meets the new requirements.

A mounting position had changed, suddenly rendering the existing safety concept for the horizontal animal feed mixer ineffective and potentially preventing the plant being delivered on time. Herbst worked closely with Pilz to develop an alternative, which would safeguard the flaps on the stirrer: an appropriate solution was quickly found with the safety gate system PSENmlock, which combines safe guard locking and safe interlocking in one device.

The flexibly mounted mechanical actuator on this safety gate system ensures a high tolerance compensation, even with sagging gates. What’s more, the closing tolerance of the secure safety gate system was increased by another 10 millimetres over a mechanical system. So now there is no longer an injury risk from an overrunning stirrer, should the service and cleaning flaps be opened too early. The horizontal mixer arrived at the customer just in time.

PSENmlock offered the customer a number of benefits in this particular application. It offered a solution that was flexible enough to be incorporated into some unusual mounting positions – ideal on this special purpose machinery. Further, with the application demanding a robust solution, PSENmlock provides a long service life as
3,000N and the large solenoid can energise under a lateral load. Advanced LED diagnostics is included on the unit, and external device monitoring is available. The Proton switch is highly reliable and suitable for most guard locking applications.

Another relatively recent addition to the Mechan Controls range is the HED safety switch for machine guarding, which enables the monitoring of two adjacent doors with a single switch and a coded magnetic actuator on each door. This saves on installation time, cabling, parts count and purchase costs. “One HED safety switch costs around half the price of two separate safety switches,” says Farrah. “So that represents a real saving for customers without compromising on safety performance.” The non-contact actuators can approach the safety switch from most angles, with a switching distance of 7mm. Safety-related specifications are Plc, Cat4 and Sil3.

Growing reputation
Looking at the typical applications for the Mechan Controls product range, Farrah says: “We’re growing rapidly in a wide range of the most challenging applications – including concrete block manufacturing, food production, dairy plants, bottling plants and pharmaceuticals. And our reputation is building around the world; we have a network of distributors across Europe and Asia, and we are growing our number of distributors across North and South America.

“It’s been an exciting couple of years,” he concludes. “And it’s also an undoubted success story for British manufacturing. There are many areas of the world where customers will always try to buy British products, and when it comes to machinery safety we’re ensuring that Mechan Controls is ready to fulfil that need.”
The growth in the number of electric and hybrid vehicles available today demonstrates the automotive industry’s determination to act upon environmental concerns. Electric vehicles (EVs) with their low or zero emissions are definitely becoming a highly strategic part of many OEMs’ business strategies.

This continued growth in demand for electric vehicles brings with it the need for a huge supply of the lithium-ion batteries required to produce the power packs. In keeping with the automotive sector’s philosophy of automating manufacturing processes, battery production also needs to be automated, not only to keep pace with demand, but also to ensure the high standards of quality and safety required.

With the compound annual growth rate (CAGR) for electric and hybrid vehicles alone estimated at around 35%, not to mention the increase in manufacture of energy storage facilities, which also use similar technology, it is clear that there is, and will continue to be for some time, a very high demand for lithium-ion battery technology. Lithium-ion batteries come in a number of forms including prismatic, cylindrical and pouch. However for automotive applications, the individual cells are predominately of the cylindrical variety, typically 3.7V and 2600mAh.

Stäubli robots are playing an increasingly important role in the manufacture of these battery packs, as sales manager Simon Jenkins explains: “The battery pack in an electric vehicle comprises a number of battery modules, which in turn are made up from individual battery cells. Some EVs may have around 3,000 individual battery cells, so as you can imagine automation plays a key role in the manufacture of these items.

“Depending upon the specific configuration of the automated production system, the applications for our robots can differ. The typical process steps where our robots add value include: initial unpacking of individual cells, handling and transferring cells through cleaning, voltage and resistance testing, laser marking and segregation of any reject cells, before good cells are assembled into module bases.”

The demand for battery packs, although significant from the major OEM’s, is just one of the growth factors within this sector. The development of increasing numbers of autonomous vehicles, together with a move towards replacing conventional petrol and diesel powered last mile delivery transport with electric powered alternatives will continue to place greater demand on battery manufacturers.

Jenkins concludes: “The EV revolution opens up tremendous opportunities for Stäubli, as our existing range of field proven robots dovetail neatly into this demanding production environment. In addition to the cleanliness, speed and precision, for which our systems are already renowned, we have recently introduced ESD compliant versions of some of our range, which makes them ideally suited for both applications in battery manufacture and motor assembly.
Safe in the robotic arms of Mitsubishi

MITSUBISHI ELECTRIC’S SAFEPLUS OPTION HELPS TO TURN HUNDREDS OF INDUSTRIAL ROBOTS INTO CO-OPERATIVE SOLUTIONS

Collaborative and cooperative robotic solutions that work together with humans are on the rise, as they can support operators on the factory floor and enhance their output. Mitsubishi Electric has increased the availability of this technology significantly with the release of the MELFA SafePlus robot safety system. This latest option allows any of the over 160 MELFA FR-series intelligent industrial robot models to be converted into a co-operative system.

Key features of the SafePlus option include robot positioning and monitoring functions, as well as Blue Danube Robotics’ AIRSKIN cover, a pressure sensitive safety skin that further helps to reduce the robot’s force and stop it if a collision occurs.

As human-machine interactions continue to advance in sophistication and increase in popularity, robots need to be able to safely work alongside human operators in an uncaged environment. To achieve this, cooperative robots need to promptly detect any intrusion into their working area and adapt accordingly, either slowing down or stopping. The removal of safety guards contributes to maximising the factory space available and increases productivity for individual production cells.

The latest MELFA SafePlus solution offers a number of new features in order to make it safer, easier and more efficient when turning Mitsubishi Electric’s industrial robots into co-operative machines that do not need safety cages. The technology can be applied to both horizontal SCARA and vertical articulated arm robots used in a broad range of industries.

The MELFA SafePlus solution includes safety monitoring functions that allow the robot to adapt to different conditions. For example, robots implementing SafePlus can avoid certain operational areas when occupied by humans (Limited Range Control), stop (Safe Stop) or reduce their speed when human operators are in their vicinity (Reduced Speed Control) as soon as the area is clear, the robot can return to its normal high speed operation.

Maximising productivity

Further enhancements have increased the robots’ capabilities to safely operate close to humans and within other space constraints, MELFA SafePlus can now bring human-machine cooperation to a new level. As a result, the number of emergency stops is reduced and machine uptime is maximised, positively affecting productivity.

The latest version of SafePlus features more than safety monitoring and collision detection functions, which are fundamental for co-operative operations. Safety logic editing, speed and positioning monitoring functions contribute to a higher safety performance.

The position monitoring function not only controls the position of the robot but also external movements in up to eight designated areas around the machine. As a result, says Mitsubishi Electric, the robotic arm can adapt its behaviour in real-time on the basis of what is happening in its proximity. For example, the robot can reduce its speed, avoid moving towards the obstacle or stop.

More info: gb3a.mitsubishielectric.com

MORE INFO: gm.igus.co.uk

Tel: 01604 677240 sales@igus.co.uk
Robots excel in heavy, repetitive and high-speed tasks, far surpassing humans in their repeatable, reliable performance. For this reason, the manual operation of machine tending – ubiquitous throughout manufacturing industry – has become a prime candidate for robotic automation.

Machine tending, typically to load and unload, for example, CNC milling and turning centres, presses or moulding machines, is a common application that is becoming increasingly difficult for manufacturers to staff economically.

Using robots instead offers far-reaching opportunities to develop Industry 4.0, 24/7, batch-driven processes that are more flexible and adaptable in future.

Currently, much of the discussion around machine tending is around the new smaller-scale collaborative or co-operative robot types. However, its more likely that industrial robots with their robust, heavyweight performance will remain the star automators in machine tending, especially as they have added potential to link process stages together and combine with other operations, such as vision quality inspection, to drive production to the next level.

But as these opportunities develop, so does the need for robot, machine and other devices like operator controls, door interlocks or laser scanners, to talk to each other seamlessly. At the same time the consequent system must fully integrate with safety circuits to meet required industrial standards. That’s simple enough to say, but in practice, it can be difficult to achieve.

Fanuc is known throughout the world as a global specialist in both CNC controls and robots, so is better placed than most to pass on the advantages of these synergies to its customers. Perhaps a little less well known is the company’s international leadership in servo-driven injection moulding machines, which are widely used by producers of smaller scale plastic products, for example in the contact lens and medical industries.

This is the story of a development collaboration between Sick and Fanuc that has charted a route to upgrade robot machine tending for injection moulding machines. The challenge presented itself when Fanuc looked to develop a side tending robot solution for its ROBOSHOT precision electric injection moulding machine. Surprisingly, perhaps, from Sick’s perspective this story is not really about sensors. Instead, Sick has applied its Flexi-Soft safety controller and EFI-PRO module for CIP Safety over EtherNet/IP to chart the way to more streamlined robot integration.

Increased production efficiency
Conventionally, an injection moulding machine fires finished parts into a bin for periodic collection by an operator. But increasingly, customers want to exploit the potential of robots to tend the machines and improve their production efficiency. Fanuc project engineer, James Pointer, explains: “Typically, on our ROBOSHOT machines an articulated robot sits on top of the machine from where it can reach down into the cell to remove the moulded parts and place them, for example, on a conveyor for the next stage of the process.

“However, some customers want the added flexibility of a robot that tends the machine from the side. As a result, there is a need to protect the safety of operators while the door of the machine cell is opened to allow the robot access.

“Injection moulding machines are governed by common data exchange standards set by the European umbrella association for plastics and rubber machinery manufacturers, EUROMAP. The standards provide a universal solution to interfacing robots and other devices to machinery for the industry, but at the moment those connections must be hardwired. The EUROMAP 67 standard is available via a single 50 core cable connector, while the EUROMAP 73 standard that governs the safety integration, including the need for three separate safety contact switches, is via a 25-core connector.
A ROBOT ‘HANDSHAKE’

“Of course, it is possible to hardwire connections between the machine, the robot, and to the robot controller which can often be located some distance from the machine. However, this is complex for our integrators and end-users to achieve, as well as being extremely costly in terms of the cabling required. To solve the problem you need a safety controller, so we approached Sick to see if they could help.”

The resulting development achieved a simple I/O ‘handshake’ between the robot and the machine by using Sick’s Flexi-Soft safety controller with the addition of the Sick Safe EFI-PRO gateway solution for standard industrial EtherNet-based safety network integration over CIP Safety. The solution was groundbreaking in bridging a gap in connectivity, as well as providing a proven, extremely simple system that provides future-proof security as both standards and connected devices align with CIP Safety over EtherNet/IP in future.

Pointer continues: “Although the EUROMAP standards still require hardwired safety, Fanuc robots support EtherNet/IP over the CIP protocol. We were able to mount a standard junction box on the ROBOSHOT machine for the Sick Flexi-Soft controller, so that the multi-core connections stay local to the machine. Then, all that was needed for the long run between the robot and the controller was the EtherNet line, together with a two core 24V cable.

“A key part of the solution was to use a mix of safety and standard (non-safety rated) input/output cards available in the Sick range, so we could wire everything back to one place in the junction box, with safety and normal I/O communications down the same EtherNet cable. Additionally, we were able to integrate a door interlock with a separate push-button stack on the side of the machine, so we can specify start, stop and reset, all conveniently positioned for the operator on the side of the machine.”

As a result of the development work between Sick and Fanuc, an elegant and very simple solution has been achieved with a safe robot ‘handshake’ over EtherNet/IP. The solution immediately presents a number of additional benefits to Fanuc’s customers, both end-users as well as system integrators. There are significantly less cabling costs, with much more simple programming and set-up. The solution is relatively simple to retrofit, so customers can introduce robot tending to existing machines and dispense with manual processes.

Connecting production processes
By integrating via the Sick Flexi-Soft controller over EFI-PRO, further robot controllers can be easily connected then programmed to work together safely. A safety logic can be established that avoids unnecessary stops that might otherwise compromise production efficiency. Now, customers have an opportunity to connect production processes together. One robot could, for example, place down a moulded part for it to be picked by the next process.

By communicating over CIP Safety, diagnostic information can be retrieved from connected devices via an HMI. So, for example, if there are Sick safety laser scanners integrated into the system, they can deliver alerts when screens need cleaning, as well as enabling operators to interrogate a history of when warning fields have been interrupted.

In future it is conceivable that the EUROMAP 73 standard will be upgraded to allow communication via CIP Safety, thus negating the need for hard wired connections. At this point, machines using the Sick/Fanuc solution will already be future-proofed and ready for the development. “By collaborating with Sick, we have provided a solution for our customers that avoids the need to add significant extra hardware to a machine, or extra cabling, while taking out a great deal of time and complexity for our integrators,” says Pointer.

While Fanuc can apply the solution to new ROBOSHOT machines for customers, its integrator partners have the basis for a ready-made package with all the building blocks necessary, including for example the safety controller, guarding and interlock devices and push button controls.

The injection moulding standards and robot controls may be specific to this application, but this case study demonstrates how, whatever the industry, companies like Sick and Fanuc will increasingly work together to bridge the gap and allow machines, robots and other devices to work seamlessly together in an open standard environment over EtherNet/IP.
Like every competitive athlete, Christopher Young stays acutely attuned to his equipment. Whether it is motorsport, cycling, skiing or any other event where equipment plays an important role in performance, athletes can feel instantly when their equipment is working properly – and when it is not.

In Young’s case, however, the margin for error is uniquely tight. As an adaptive skier, who reaches speeds of 70mph, Young relies on his mono-ski to keep him competitive and safe. He has significant and rare athletic gifts but his racing career could come crashing down at any moment if his sled malfunctions. “My life, literally, depends on the equipment not breaking,” says Young. “There are some places on ski slopes where falling is not an option. If you fall, you could drop off a cliff, it is the end, goodbye.”

For the past seven years, Young has been using equipment made by DynAccess, a Pennsylvania business that designs and manufactures outdoor equipment for physically challenged individuals and athletes. Joachim Grenestedt works as the chief engineer and product designer for DynAccess, while his wife, Channy Tokura, runs the business side.

“What makes DynAccess different is their attention to detail,” says Young, a five-time member of the US Paralympic team and multiple Paralympic medalist. “DynAccess has elevated our sport to mainstream. DynAccess has elevated our sport to mainstream. Joachim’s got this idea that he’s going to be the premier mono-ski maker in the world. Channy is the best customer service representative I’ve come across for any adaptive equipment I might need.”

Grenestedt had used his engineering expertise to design land speed racers, boats and aircraft. He turned to designing mono-skis, when a former student was injured in an accident and lost the use of his legs. “I’d seen a lot of these adaptive skiing programs and it is truly amazing what some people can do,” Grenestedt said in an interview with Lehigh University. “Skiing is a high-adrenaline outdoor sport with lots of action, and I love it.”

While watching his student, Grenestedt noticed a number of the mono-skis were broken. “I believed we could design and manufacture a better sled,” he says. Tokura started DynAccess in 2011 after receiving a Technology Transfer Grant from the Keystone Innovation Zone. Word travelled quickly in the tight-knit adaptive skiing community.

A mono-ski consists of a bucket seat and a stiff and strong frame with suspension mounted to a single ski. DynAccess offers four models of mono-skis, and they are designed to be more durable, adjustable and responsive than any other mono-ski on the market. Their equipment works well for all levels of adaptive skiers, from beginners to professionals. They can also be adjusted as a skier’s skills improve and have superior durability.

All models are equipped with Penske Racing shocks. The shock absorbers are developed specifically for mono-ski applications. Penske technicians build all the shocks to order from DynAccess and they all undergo dyno-testing. Each mono-ski package includes a frame, racing shock, thermo-formed bucket seat with foam pads, adjustable chest, lap and thigh straps, an adjustable foot rest, evacuation straps and foot piece.

Besides the shock absorbers, some other key components in the DynAccess mono-skis are products manufactured by Igus. The mono-skis use iglidur X bearings, which offer universal resistance to chemicals, high compressive strength and low moisture absorption. They also offer excellent wear resistance through temperatures ranging from -100°C to +250°C. The material also has extremely high tensile strength and is one of Igus’ most widely used bearings for solving highly technical issues.

“We tried other components and they worked fine, but the Igus products work better,” says Grenestedt. “They offer low wear, good strength, small size and no corrosion at a good price.”

Young says DynAccess’ attention to detail has raised the bar worldwide in the engineering of the mono-ski: “Joachim has introduced more precise techniques and engineering, and more precise bearings and suspension. It has elevated us to finally achieve parity with able-bodied skiers.” Young was injured in a plane crash in Alaska in 1982 while serving in the United States Coast Guard. The accident left him paralysed from the knees down and partially paralysed below the waist. He was introduced to skiing and racing at a Veterans Administration Winter Sports Clinic and has gone on to achieve worldwide success. He won his first gold medal in the Paralympic Games in 1994 and became the first Paralympian to win two medals when he won a gold and a silver in the 2002 Paralympic Games in Salt Lake City. He won the Mono Skier competition at the 2015 X Games, becoming the oldest gold medallist in the history of the competition.

On the slopes and off, Young’s physical challenges give him the perspective to know when engineering and technical expertise work together to improve his quality of life and athletic performance. He has found that with DynAccess. “What makes DynAccess different is their equipment is a combination of superior engineering, durability and parts, coupled with the best in customer service,” says Young. “They have a company ethos of building better, safer equipment and they give us adaptive skiers a pretty good day on the slopes.”
Southern Manufacturing & Electronics returns to Farnborough from February 11th to 13th. The show will fully occupy the 20,000m² Farnborough International Exhibition Centre and, as in previous years, the 2020 event will host an impressively broad exhibitor list spanning the complete range of engineering activity, from high-tech machine tools and automation to components and subcontract services. Firms from all over the UK will be participating, together with a significant number of off-shore exhibitors from across Europe, Asia and the Far East.

The show is divided roughly equally between manufacturing and electronics. The Production, Tooling and Machinery section is one of the biggest attractions, providing visitors the opportunity to see the latest offerings from an excellent selection of international vendors in action. Highlights this year include demonstrations of hybrid additive and subtractive manufacturing from Matsuura Machinery, automation solutions from XYZ Machine Tools and Mills CNC, plus a huge range of machine tools from leading brands such as Bystronic, C. Dugard, Haas Automation, Hurco, Trumpf, Unison and Yamazaki Mazak amongst others. Other well known names include AMF Andreas Maier, Faro, MecWash, Broderer, Blum Novotest and Roemheld. There are also numerous examples of the latest additive manufacturing technologies from leading vendors such as Laser Lines, Creat3D and CDG 3D Systems.

The electronics aspect of the show offers an abundance of production, automation and test systems from firms such as Blundell Production Equipment, AdoptSMT, ASM Assembly Systems and PAC€ Europe amongst others. Component vendors include ESI Technology, Wurf Electronics, TDK Lambda, Lusò Electronics, the Rebound Group, Cosel Europe, Selwyn Electronics, Transfer Multisort Elektronik and Austria’s CODICO GmbH amongst many others.

The show also highlights an enormous range of industrial equipment and workshop essentials, such as automated retrieval solutions from Kardex Remstar, storage systems from Bott and modular workstations from Kanya UK. Yaplex showcases its materials handling systems, and there’s a wide selection of consumables from well-known brands such as Henkel Loctite, Amberills and Lohmann Technologies.

Alongside the hardware, Southern Manufacturing is also a vitally important marketplace for subcontract services of all descriptions, from contract electronics manufacture to highly specialised precision engineering and finishing. Many of the exhibitors have specialist experience within the aerospace and automotive sectors – both highly active industries in the South.

The show is partnered with the Farnborough Aerospace Consortium, alongside national bodies including Composites UK, NetComposites, the Confederation of British Metalforming, the SMMT, the GTMA, the British Gear Association and Locate in Kent. Much of the expertise encompassed within these organisations will be accessible to visitors via the show’s ever-popular free seminar programme.

Running in two lecture theatres over all three days of the show, the programme covers a wide-ranging agenda, from advanced materials, additive manufacturing and Industry 4.0 to real-world examples of business transformation and Lean. The seminar programme gives delegates the opportunity to gain insight at the very highest level into many of the biggest issues facing industry today. All sessions are completely free to attend and open to all visitors to the show.

Award winning author of Staying Lean, creator of the Lean Iceberg Model and partner at S.A. Partners, Gary Griffiths, will discuss how organisations have successfully delivered results for their business by embedding and sustaining Lean and Continuous Improvement. Popular presenter Ailsa Carson of Onsite Insights gives examples of best practice in manufacturing through ten, real-world case studies. Kevin Askew of GoPrint3D reviews the Additive Manufacturing Landscape and the applications of the technology, from prototype to end-use parts. Steven Barr and Ravi Gidoomal of Edge Digital Manufacturing discuss how to develop a digital roadmap for your business and identify the right digital technologies to maximise value.

Mark Knowlton from Locate in Kent will present Delivering Industry 4.0 – an examination of how SMEs can benefit from embracing digital manufacturing. In 4.0 The Quality Revolution, Mike John of The Sempre Group looks at how British Industry must evolve its quality control in a global competitive market. Nick Atten and Dr Alex Martin of the RINA take a look at Counterfeit components and product compliance challenges, while Dr Chris Robertson discusses Life after Brexit – What next in trade relations and product regulation. Mike Foster, managing director of The CE Marking Association will explore another aspect of the post-Brexit landscape in CE Marking 2020 and Beyond – How the changes will affect all manufacturers.

Farnborough International Conference and Exhibition Centre offers complimentary car parking for 3,500 vehicles and is well-served by road and public transport links. A regular free shuttle bus service operates from both of Farnborough’s mainline railway stations directly to the exhibition. The venue itself provides a high standard of facilities including a complimentary WiFi service in the foyer area as well as high quality catering outlets.

Southern Manufacturing & Electronics 2020 opens from February 11th to 13th. Admission to the exhibition is free of charge. More information and tickets are available from www.industrysouth.co.uk.
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