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I've found myself increasingly disenchanted with, and seemingly disenfranchised by, the BBC. The corporation seems to be going out of its way to destroy everything I love, both radio and TV. From relinquishing all rights to any meaningful live football to the worst adaptation I think I've ever seen of HG Wells’ “War of the Worlds”, the BBC has systematically either divested itself from or ruined anything and everything that I might want to watch. And don’t even get me started on Doctor Who or the abandonment of Bake Off? Has the BBC no shame?

What, I keep asking myself, am I paying for? I accept that this is a joint funding exercise so that the BBC can develop a diverse range of programming to support the broadest spectrum of tastes and requirements, but I’m starting to feel deliberately targeted for exclusion. All I’m waiting for now is a news report on the questionable ethics of gyms that lock their members into long term contracts that they can’t get out of for services they don’t even come close to getting value from, and I’ll be sending in a harshly worded ‘Pot, Kettle, Black’ letter to the BBC complaints department. At best, it’s all become painfully average.

A lot of this has come to a head during the last few months because while, like so many other people, I’ve been working harder than probably I ever have, at the same time I’ve barely left the house, and therefore have had much more time to evaluate products and services from numerous suppliers. Some – and Amazon immediately springs to mind – have completely redefined expectations. Never mind next day delivery; now I can have same day delivery. Others (no names, but I’ve recently tried to buy a new car) seem to have no clue about real customer requirements and have a completely misguided notion of what customer satisfaction really means.

Now, of course it feels exceptionally good to have an on-page rant, but let’s not forget that we’re all customers and we’ve all had time over the last few months to evaluate our satisfaction with the products and services that we’re paying for. And, more importantly, we all have customers of our own who are doing exactly the same thing with the products and services that we supply. There has been much talk about ‘the new normal’ for businesses, but less about customer expectations in the new normal, and it would not surprise me in the least if there has been a fundamental shift.

In a highly competitive industrial environment, will ‘good’ be good enough? I think we’re going to have to work harder to achieve, demonstrate and, importantly, communicate excellence in products and services to ensure that the B2B customer experience matches the same expectations that consumers have from their B2C customer experiences. Because if we don’t or can’t, there will almost certainly be a competitor who can and will.

Mark Simms
Editor
CON

THE HEAT IS ON

Dave Walsha, commercial development officer at Electromechanical Systems (EMS), looks at the applications of infrared camera technology and the motor technologies that are advancing them

FLIGHT ATTENDANT

Time-of-Flight laser sensors can reliably detect objects of various colours and materials, based on the time difference between the emission of light and its return to the sensor. We look at the benefits and applications for these compact devices

BACK TO BUSINESS

Manufacturing output volumes in the three months to November fell at their slowest pace since September 2019, but the pipeline for activity weakened in October

How can digitalisation, sustainability, customisation and regionalisation will help build the supply chain of tomorrow? Schneider Electric’s Mark Yeeles explains

Artificial intelligence (AI) and robotics can play a key role in powering up the industry, says Henry Claussnitzer, business engagement manager at Omron Europe

THE NEW NORMAL

Greg Hookings, Head of Business Development – Digitalisation, Stratus Technologies, looks at how edge computing can prepare manufacturing for the new normal in a post covid-19 world

Dr Martin Kidman of Sick UK, provides a useful, step-by-step ’walk through’ of the principles of Safe Networks, how safe information can be transmitted over them, and the advantages that can be gained

The fundamental element of any production cell is how to guide and transfer a component around the system. There are many options, each offering different advantages

In the building of chiron, a new breed of construction robot, eight mechanical engineering, two electrical engineering and three systems engineering students have put their theoretical knowledge into practice
MATERIAL CONSIDERATIONS

there are a number of factors to take into account in a spring’s application before going ahead with the design and manufacturing process, as Airedale Springs chairman, Tim Parkinson, explains.

SECURE FASTENERS

When threaded bolts, screws and nuts come loose, not only can it compromise the performance of equipment, but it can also pose a safety risk.

Stephen Hayes of Beckhoff Automation UK explains how food processing operations can be reconfigured with machines that can be transported and moved, more easily and faster than traditional machinery.

A field equipment shelter fitted with fault-tolerant cooling is ensuring the reliability of a wireless communications link that connects instrumentation on a new gas pipeline to the remote control room.

Lagwell Insulation, a specialist in thermal insulation, relies on Spelsberg thermostats to deliver performance and value for many of its frost protection systems.

Where traditional air-cooling methods are unviable or simply not especially effective, liquid cooling is an option open to all, and one that is much more effective than air at removing waste heat.

KEB Automation has helped a customer in Germany convert its high-bay warehouse storage and retrieval machine from an old-generation frequency inverter to the new COMBIVERT F6 drive controller.

DISPENSING TIPS

Wearable technology is growing in importance in the medical sector. Peter Swanson, managing director of adhesive specialist Intertronics discusses best practice for dispensing processes in wearable device manufacturing.

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TIME FOR CHANGE WITH THE NEW G5/5 REGULATIONS

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Manufacturing demand slumps as activity continues to be weak

Manufacturing output volumes in the three months to November fell at their slowest pace since September 2019, but the pipeline for activity – including output expectations and order books – weakened in October. That’s according to the latest CBI monthly Industrial Trends Survey. The survey of 277 manufacturers found that output volumes declined in 9 of 17 sub-sectors, with the headline drop in output driven by the aerospace manufacturing sub-sector. Total and export order books both weakened in October, remaining substantially weaker than their long-run averages.

Looking ahead, firms anticipate that output will decline at a slightly faster pace over the next three months. This marks a worsening in expectations compared to last month’s survey. Manufacturers also expect output prices to fall over the next three months.

Anna Leach, CBI deputy chief economist, said: “Output volumes have declined at their slowest pace in over a year in our November survey. But order books have softened again as global demand has been hit by intensified lockdowns, and manufacturers have trimmed their expectations. Firms have done all they can to adapt their operations to the current conditions, but pressure remains intense. The extension of government support – notably the Job Retention Scheme – is very welcome. Key to stabilising trading conditions for manufacturing firms will be getting the pandemic under control through further investment in mass testing, ensuring a seamless test and trace system, and an efficient vaccine rollout.”

Tom Crotty, group director at INEOS and chair of the CBI Manufacturing Council, said: “These results show what we already know – that manufacturers up and down the country are continuing to face very difficult circumstances as we move into the winter. Looking ahead, manufacturers have a crucial role to play in working with the government to build its green industrial revolution, improve productivity and level-up regions. Government support for the sector has therefore been – and will continue to be – vital in keeping firms going through the crisis.”

In the three months to October, following July’s record decline and prior to the November lockdown, SME manufacturers had reported that total new orders had stabilised, following a survey-record pace of decline last quarter. The decline in employment had slowed from the last quarter, the cut in headcount among SME manufacturers remained significant. Business sentiment was roughly unchanged in the quarter to October, following a slight recovery in July.

Alpesh Paleja, CBI lead economist, said: “The second national lockdown will inevitably mean that prospects are now looking bleaker. However, the step up in Government support is welcome. In particular, extending the Job Retention Scheme further will give companies the certainty and stability they need to help safeguard jobs. If signs of additional strain are growing among SME manufacturers and their supply chains, the Government may need to think about more tailored support.”
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Building the supply chain of tomorrow

HOW CAN DIGITALISATION, SUSTAINABILITY, CUSTOMISATION AND REGIONALISATION WILL HELP BUILD THE SUPPLY CHAIN OF TOMORROW? SCHNEIDER ELECTRIC’S MARK YEELES EXPLAINS

Supply chains are in the spotlight and following Covid-19, there has been greater speculation on how they will adapt in the future. In recent years, with efficiency as a constant driver, we have been experiencing a transformation defined by four key trends, including digitisation, sustainability, customisation and regionalisation. With resilience at the top of everyone’s agenda, what will this mean for supply chains in the long term and how are these four existing trends are set to accelerate?

Supply chains must adapt to different types of customers. Customisation becomes the new normal with tailored requests, speed, and local engagement becoming necessary. A “one-size-fits-all” approach to supply chain is not suitable as it inhibits growth and broadly leads to overall dissatisfaction. When embarking on our own journey, we have developed five Supply Chain models to reflect the expectations of our different customer segments, including integrators, electrical distributors and end-users.

Digitisation provides the answer to building a customer centric supply chain. All customers are searching for efficiency, productivity, and quality gains. Unless operating processes are connected, systems and tools cannot truly support the needs of customers or the business to provide one version of the truth.

Connectivity allows us to control, monitor, and optimise every part of the process. It creates the desired end-to-end view, which can be visualised at Unified Operating Centres located at key points around the world, to provide on-site, real-time knowledge driven by data analytics. Such connectivity creates the ability to

The hidden costs that could damage profits

TFC’S KEITH KENTISH HIGHLIGHTS SOME UNSEEN SUPPLY CHAIN COSTS AND EXPLAINS HOW MANUFACTURERS CAN AVOID THEM

According to MoneySuperMarket millions of people are overpaying on their mobile phone contracts, whether it’s for data, minutes or texts that they don’t use. Hidden costs can be found everywhere, including your supply chain, where they could be seriously eroding your profit margins.

The Covid-19 pandemic has made it more difficult for manufacturers to source the parts they need, and an April 2020 PwC poll advised that a quarter of UK manufacturing management were concerned about the impact of lockdown on the continuity of their supply chains. Now, as ever, the priority for most supply chain managers is keeping operations running while minimising costs – some of which may be hidden.

In many supply chains, a lot of time is spent keeping track of inventory and even more is spent making and processing the required orders. This issue is often exacerbated when companies work with multiple suppliers because each supplier comes with its own paperwork requirements. According to a report by Zencargo, a digital freight forwarder, more than 100 million hours of time is wasted by UK businesses in procurement, supplier management and freight administration annually. This creates an annual cost in excess of £1.5 billion.

It would be far more valuable to reduce the amount of administration required and move staff into more productive roles. Vendor reduction and rationalisation is a good way to achieve this, as it means fewer orders, far less paperwork. An even better approach would be a vendor managed inventory (VMI) system. VMI benefits include, but are not limited to, technology to trigger automatic stock replenishments, supplier onsite stocking and consolidated invoicing. This can reduce the required administration and management time of c-class components.

In addition, smaller companies may find it hard to get good value without significant purchasing leverage, particularly if they change suppliers. According to a recent poll, at least 10% of companies have changed suppliers as a result of the pandemic. The key here is relationships — maintaining long-term partnerships with trusted suppliers. Smaller companies can benefit from the leverage of a larger VMI service partner. For example, we regularly purchase on behalf of numerous trusted suppliers. Smaller companies can benefit from the leverage of a larger VMI service partner. For example, we regularly purchase on behalf of numerous businesses, consolidated demands, from our UK,
make better decisions and predict demand with customers, triggering a reaction along the links and activating frontline teams to address needs more efficiently. Together, connectivity and artificial intelligence can eliminate downtime by continually running tests to improve performance, detect issues and create diagnosis before outages occur. This enables predictive analytics to provide real time information that supported up to date decision making, which in turn reduces the risk of unplanned downtime.

Thanks to digitisation, suppliers can be fully integrated into an “extended supply chain”, encouraging transparency and traceability. Digitisation becomes a foundation for circularity. It opens manufacturing to all shareholders and changes the relationship between suppliers and manufacturers. Of course, the human component is key. Digitisation allows for agile management, augmenting and empowering field operators and enabling unmanned operations to ensure their safety. It breaks down silos and builds collaboration and trust.

Sustainable momentum across the chain
While the headlines might have increased in recent years, sustainability in supply chains is not a new trend. Supply chains are major contributors to environmental impact and since the early 2000s, many sustainable initiatives have been undertaken. While this momentum was already underway, it will be accelerated going forward.

The need for sustainability to address primary threats such as Climate Change has been reinforced by Covid-19 and will be a priority in recovery plans. Governments and businesses alike are focusing on a green future.

Greater regionalisation
The past twenty years have seen the supply chain footprint shift. In early 2000s, the footprint was highly concentrated in mature markets. By mid-2000s, to align with customer footprint and optimise costs, it shifted to an industrialised footprint with international production lines. Today, the risks associated with long chains, along with growing trade tensions and geo-politics, are causing many organisations to again re-evaluate.

Over the past ten years, we have implemented a multi-local and balanced footprint approach, complemented by tight global coordination. For this to increase – we need to further build our local resilience through shorter supply chains, rooted in local communities. This is not a shift from globalisation, merely a new form – with global players connected in shorter chains.

Building the supply chain of tomorrow
There are many questions circulating about to what extent Covid-19 will change or accelerate these trends. There is no denying that the crisis was a supply chain crisis (caused by lockdowns, borders closing, country-by-country specifics). However, Covid-19 has not changed the fundamentals; rather it has acted as a catalyst that is forcing all organisations to rapidly adopt these trends. This builds resilience, and those who embrace it quickly will set themselves up for success.

A purely local footprint is not feasible – one disruption can bring down the whole chain. To overcome this, organisations need to regionalise, with a form of redundancy, and empower the local level, with a tight coordination of local sites. Of course, such reorganisation will impact costs. But it will be in both ways – increased CapEx for redundancy and relocation, and reduced costs due to decreased inventory and working capital from shortening the supply chains, as well as higher sustainability.

Resilience requires an end-to-end vision. It should be considered at the level of the interconnected partner ecosystem. It requires visibility and transparency from both Tier One and Tier Two suppliers all the way to customers. Business continuity plans need to reflect this end-to-end value chain.

A step change in efficiency can be achieved through integration across four axes: the integration of energy and automation to achieve both energy and process efficiency; the vertical integration of end-point to cloud, so all data from the shop floor upwards is visible; the lifecycle integration, capturing data from design and build, all the way to operation and maintenance, to eliminate the inefficiencies in the transition from CapEx to OpEx; and the integration of all sites and workshops into One Unified Operation Center for a big-picture view of energy and resource consumption.

Technology is the answer; we need digitisation across every aspect of the chain. Automation can support event response and day-to-day operational management, predicting and mitigating risks to customer demand and shaping scenarios to delivery optimal efficiency and agility.

MORE INFORMATION: www.schneider-electric.co.uk
Re-energising European battery cell production

ARTIFICIAL INTELLIGENCE (AI) AND ROBOTICS CAN PLAY A KEY ROLE IN POWERING UP THE INDUSTRY, SAYS HENRY CLAUSSNITZER, BUSINESS ENGAGEMENT MANAGER, OMRON EUROPE

What can European automotive companies do to future-proof their production lines, especially in relation to battery manufacturing? Robotics, automated quality control and artificial intelligence (AI) can help companies to tackle the strong competition they are facing from Asia.

Some of the key current trends in the European automotive industry include e-mobility, alternative drive types and sustainable transportation strategies. Some 14 million people are employed in and around this automotive sector. Another four million jobs are closely linked to other e-mobility applications used in buses, trams, ships, mining equipment, trucks, agricultural machinery, forklifts and many other areas. Many entrepreneurs, managers and politicians are faced with the question of whether the industry and the European economy are too dependent on imported technologies such as battery cells.

Against this background, the European battery industry is currently repositioning itself in order to increase its competitiveness and future strength. It is looking for innovative and integrated approaches for future battery production that combine smart robotics, sensors, automated quality control, intralogistics, AI and machine learning. These will provide the best possible method of support for machine operators and employees.

Funding local battery cell production

One of the biggest challenges in battery production comes from fierce competition from Asian companies. As in other sectors, European manufacturers are struggling to keep up with low-cost production as a competitive advantage. In contrast, Asian manufacturers have strategies aimed at the reliable production of large quantities of standardised products and dominate the global production of many important e-mobility products today. China, Japan and South Korea are the largest players in worldwide battery cell production, which is a key technology in e-mobility.

In response, the German Federal Government and the European Union are planning various subsidies to support European battery cell production. For this strategy to succeed, the German government will invest some one billion euros from the energy and climate fund by 2022, and corporations will follow suit. For example, Volkswagen plans to start its own battery cell production in Salzgitter, Lower Saxony, by 2023.

The competitiveness of the European e-mobility industry depends upon its ability to identify and implement new, high-performance technologies and approaches that enable the cost-effective production of high-quality battery cells and other e-mobility products. An important pillar of such strategies is artificial intelligence (AI). When used properly, it can open up new value creation potential in the highly complex production chains involved in the manufacture and assembly of e-mobility components.

At the same time, AI-based tools paired with robotics, sensors and machine vision technology help manufacturers to gain a better understanding of their processes. They can then use these new findings to optimise processes inside and outside the company. This approach can be combined with other AI-driven tools in logistics and predictive maintenance. This will all help European battery manufacturers to benefit from stronger competitive conditions and cost advantages.

Opening up new markets

But AI can do more than create a level playing field. With the help of AI-based systems and solutions, companies can capture market shares in the ‘Blue Ocean’ segments (marked by differentiation and low costs) that are currently under-supplied. Instead of operating in highly competitive ‘Red Ocean’ markets, companies should open up new market opportunities and offer customers new products or services.

The still young area of e-mobility is very suitable for this. By increasing process quality and agility, AI is fuelling the production of very customer-specific, complex and high-quality components for this growth industry. It is also increasingly supporting small and medium-sized businesses that use tailor-made and new manufacturing applications. As a result, they are well positioned and can easily keep up with established names in the industry.

AI offers huge potential benefits for e-mobility. However, these possibilities can’t develop their full potential unless they are tested, validated and presented as a credible business case in real factory use. The automotive sector has a rather conservative and ‘wait-and-see legacy’ approach towards introducing new technologies. But that’s not all: the use of AI-based technologies also requires a certain level of trust on the part of the user. The best way to build this trust is to involve users in the design of the AI solution at an early stage.

Within e-mobility, it’s possible to integrate the right combination of AI technologies into selected workflows of end-to-end production and assembly. However, some fluctuations can have a negative impact on product quality. AI can offer an additional benefit in the business case, by responding to the need for the production of highly customer-specific e-mobility components such as battery cells. Ideally, AI will help the user to identify and understand the cause-effect relationships of undesirable deviations that could undermine product quality. At the same time, it will help operators to anticipate an effect on product quality and, if necessary, will even help them to react in real time. Last but not least, production lines for new product formats can be configured more rapidly and effectively. But, as before, the project will stand and fall depending on the acceptance of the employees.

Tips for tomorrow’s production line

Assembly lines of the future are a combination of different modules and technologies, linked with intralogistics. Each module is responsible for a specific section of production: from sorting and alignment through to processing (for example coating, filling, cutting, stacking or welding right up to labelling and inspection). The production line can be fixed or movable and can connect processes with conveyors, push carts and automated guided vehicle systems, such as mobile robots. Common fields of application are the assembly of battery cells and material handling.

Competitive strength in battery production requires powerful and closely integrated technology, along with well-informed advice. A holistic and AI-based application will help manufacturers to avoid rejects. An intelligent warehouse system, supported by mobile robotics, can increase process efficiency and reduce unnecessary manual effort. The battery cell quality should be controlled by a production and lifecycle solution that covers all of the stages from manufacture to use and recycling, and is flanked by an in-line inspection system. These are key aspects that should be considered if European battery cell manufacturers want to keep up with, or even overtake, the competition.

MORE INFORMATION: industrial.omron.co.uk
Distributor becomes manufacturer of social distancing solution

Turck Banner’s systems division has a reputation for bringing together a diverse array of products to form cohesive systems solving the requirements of major industrial companies. However it had not manufactured its own product in the UK until July of this year.

Early in the Covid-19 lockdown Turck Banner saw an opportunity to support shopkeepers’ need to control the flow of customers entering their premises. Customers were often seen queuing outside shops unsure whether it was safe to enter or not, and often avoiding shops with a long queue altogether. Turck Banner’s systems team were challenged to come up with a solution using the four following criteria: it needed to be simple to use, easy to fit, low cost and adaptable to changing government rules.

Two solutions emerged. The first was a simple combination of a power plug, an inline changeover switch and a red-green tower light. The light could be mounted in the shop door or window with the switch placed near the till. The shopkeeper could then turn the light red or green, like a traffic light, to allow customers into the shop or request that they wait. This could be sold for just £90. The second solution replaced the mechanical switch with a remote control, allowing the shopkeeper to turn the light red or green. This had a higher price at £210 but reduced the installation requirements.

Turck Banner trialled both systems at a variety of shops and found the light needed to be more prominent. Mounting it outside the shop could be a solution, however this would require permanent installation work. Temporarily running cables around some shops was also challenging.

Using feedback from the trials, the systems division developed a standalone cordless control station. It used the remote control, which was the most popular of the original designs. The tower light was replaced by a daylight visible red/green traffic light mounted on a 1.5m post and a base containing a rechargeable battery and the remote controller. The station is weatherproof and is positioned at the entrance. The traffic light gives a clear instruction to enter or wait, and a repeater indicator is located on top of the post to ensure that the shopkeeper can see if the traffic light colour is red or green from 360 degrees. This solution still costs just under £500 and requires no installation.

With the new system proving very successful, the systems division turned its attention to the more usual, industrial customers to see how this may be of benefit to them. Two opportunities to assist were identified. Customers required monitoring of enclosed spaces to ensure safe occupancy and to maintain social distancing on stairways.

Many enclosed spaces which now have reduced occupancy need external control. The occupancy version of the control station has sensors mounted to the post which detect the presence and direction of a person entering or exiting the room. A second version addresses maintaining social distancing on stairs, and is fitted with a single sensor which detects anyone passing as they start upon the stairs, at which time the indicator light turns red for a set period of time before returning to green.

Turck Banner managing director Peter Gardner said: “In these times when many people are struggling it feels good to be able to support local businesses both in providing solutions and by procuring as many parts as we could locally and manufacturing locally.”

More info: www.turckbanner.co.uk

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MACHINE BUILDING

Kistler launches world’s first charge amplifier with IO-Link technology

A new flexible, miniature charge amplifier with IO-Link, claimed by Kistler to be a world first, complies with industrial communications networking standard IEC 61131-9 and combines analogue and digital communication technology to pave the way for Industry 4.0. The new charge amp is said to be ideal for applications over a wide range of industry sectors, including robotics, packaging, food and beverage, as well as OEMs. Its small size (L 38mm x W 25mm x H 31.4mm including the output connections) and its low weight of only 30g means that the amplifier can be installed where space is at a premium, such as robotic heads and other moving parts.

MORE INFORMATION: www.kistler.com

ABB Food Safe motors withstand over 1,100 washdown cycles

Maintaining product safety in food and beverage plants requires strict hygiene standards. Frequent washdowns are required to avoid contamination. The challenge is that electric motors used in these facilities can be damaged by aggressive cleaning. ABB Food safe motors to address the washdown challenge. They feature a stainless steel housing to resist corrosion, and IP69 ingress protection to ensure that high-temperature, high-pressure spraying will not cause damage. They are also easy to clean, with a smooth, self-draining outer surface that has no angles where contaminants could gather.

MORE INFORMATION: www.abb.com

I/O modules enable process control with the need for a separate PLC

Two new series of I/O modules for Control Techniques’ drives have been designed to enable applications to be managed without the need for a PLC or SCADA system. In the first configuration, add-on RTMoE or Modbus TCP Remote I/O modules connect directly via the on-board Ethernet port of the M7XX series drives, or via the on-board Ethernet port of the MC210 Machine Control option modules. In the second configuration option, add-on EtherCAT Remote I/O modules connect via the on-board EtherCAT port of the MCe or MCz controllers. They can also connect through any EtherCAT port on any PLC or controller.

MORE INFORMATION: www.controltechniques.com
Preparing for The new normal

GREG HOOKINGS, HEAD OF BUSINESS DEVELOPMENT – DIGITALISATION, STRATUS TECHNOLOGIES, LOOKS AT HOW EDGE COMPUTING CAN PREPARE MANUFACTURING FOR THE NEW NORMAL IN A POST COVID-19 WORLD

The Covid-19 pandemic is changing the world, and many sectors, including manufacturing are seeing a host of new challenges as a result. Whilst business leaders are adjusting to new market conditions to meet the new normal, this actually presents a unique opportunity for businesses to take a comprehensive view of their operations and seek out improvements. Manufacturers are exploring digital technologies to transform their operations to reduce risk and future-proof production processes. Whether they are looking to optimise machine health or secure valuable data, manufacturers are looking to automate business-critical operations and are looking to Edge Computing to help.

The opportunity to take stock and change operations goes even further than the plant-floor, and the opportunity to add capabilities and meet the challenges brought on by Covid-19 goes all the way to the Original Equipment Manufacturer (OEM). At a time when Digital Transformation is paramount to success, OEMs need to look towards Edge Computing, essentially building in future proofing and passing the benefits of that capability on to the customer.

What is the new normal?

Covid-19 has illuminated several aspects of manufacturing that will change in the new normal, especially concerning supply chains and availability. Manufacturers are advancing their digital transformation in response to the crisis and looking towards smart factories to protect themselves from global disruptions. And as we know, smarter factories need smarter equipment.

The industrial sector already sees its fair share of assets located away from the traditional data centre, and under the new normal, specific IT expertise might also be considered a remote asset. With social distancing in place and IT personnel working elsewhere, on-site operators can be compromised by the wait until help arrives. In this way, the new normal continues the trend of IT and OT convergence as those on-site will be expected to identify and rectify a problem without the IT personnel.

Digital transformation, future-proofing and intelligent automation are all goals of the current manufacturing facility owner, OEMs have the ability to package these capabilities through Edge Computing.

Smart factories are digitalised and connected plants are integrating supply chain solutions, optimising asset performance and improving overall efficiency through smart machines. The machines are equipped with IoT enabled sensors, intelligent controllers and HMI/SCADA systems. All of these elements are part of digital transformation and realising the full benefits of these technologies and ensuring their safe and reliable operation requires Edge Computing.

Edge computing for OEMs

Edge Computing is not just another element of digital transformation but fundamental to its success. Machine Builders need to build in an Edge Computing platform that meets the needs of the customer’s operational environment with three key words in mind; scalability, reliability and autonomy. Essentially future proofing their own products, OEMs can start small with a customer and scale up, bringing in new features and capabilities without the need for major design or architecture modification.

Essential features

So what are the essential features OEMs should look for in Edge Computing? The starting point needs to be built-in virtualisation. This gives the machine builder the ability to combine traditional monitoring and control software with additional applications. Applications like data historians, MES, analytics and even AI solutions can all be running simultaneously under a single platform using multiple virtual machines. This is especially important under the new normal, with the simplified machine design thin clients can be installed, making the solution more flexible and giving operators the capability to run machines remotely using personal devices.

At a time when downtime can mean more than loss of profits but also reputational damage and equipment safety issues, your chosen Edge Computing platform needs redundancy. The best approach is to pair two platforms configured as a redundant pair so that if one node fails, the other node will take over – completely autonomously, without interrupting any applications.

The next thing your Edge Computing platform needs to be is protected. Whether your machine is far out in an offshore platform or inside a production facility. Machine Builders have a duty to conform to certain standards, specifically ISA/IEC 62443 guidelines. This means OEMs need to be looking for host-based firewalls, restricted USB ports, communication protocols and a secure and trusted boot.

As mentioned, the need for simplicity in the new normal is more important than ever. Whilst the worlds of IT and OT continue to converge, the high-level IT expertise normally reserved for the traditional data centre could be further away than ever.

For any OEM looking for an Edge Computing platform, the best approach is to develop it with three guiding principles; simple, protected and autonomous.

The OEM marketplace is highly competitive and whilst the new normal brings challenges to manufacturing, it also brings opportunity. Digitalisation is no longer a choice, manufacturers are looking to create smart factories and at the heart of this is smart machines. OEMs who want to separate themselves from the competition must not only achieve their own digital transformation but give their customers the tools to do so as well.

For more information, visit www.stratus.com/oem/

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Connected safety for improved productivity

WHAT IS A SAFE NETWORK AND WHAT BENEFITS DOES IT OFFER FOR SYSTEM DESIGNERS AND USERS?

Dr Martin Kidman, Safety Specialist at Sick UK, provides a useful, step-by-step ‘walk through’ of the principles of safe networks, how safe information can be transmitted over them, and the advantages that can be gained.

Ever since they became an option in the 1960s, automation systems have traditionally been ‘hard wired’ using programmable logic controllers (PLCs). The introduction of digital logic circuits is seen as central to the industrial digital age and is sometimes called the ‘Third Industrial Revolution’.

The PLC offered increasing automation versatility and, when hardwired to field devices, it could use the inputs from them to drive outputs through combinational and sequential logic. As PLC technology developed, communication between different devices and other PLCs was enabled, such that more information could be transferred, for example between remote I/Os, motor drives and servo controllers.

Communication between electrical components requires a bus system and a protocol - either open standard protocols or proprietary protocols. When two or more devices communicate, each device in the network is referred to as a ‘node’. These nodes, which would normally have a unique address, can communicate via the bus system, providing HIGH/LOW signals according to the protocol. This offers many advantages over traditional hardwired systems: the time and cost needed for wiring the system are dramatically reduced, as is the installation time. There are new opportunities to monitor and diagnose maintenance issues. Systems can be easily expanded, or devices replaced, and it’s possible to add more intelligent field devices to the network.

There are now many different types of networks used in industrial environments, which allow the exchange of data between systems and the connections between devices can be established using either cable or wireless media.

Adding safety over networks

The possibility to transfer safe (as opposed to ‘non-safe’) data over networks has only really been possible since the turn of the 21st century, when the standard IEC 61784-3 was published. This covers functional safety fieldbuses and gives the general rules and profile definitions of adding a safe data layer on top of existing fieldbus protocols. Today, there are many safety protocols such as PROFIsafe, Functional Safety over EtherCAT (FSoE) and Common Industrial Protocol Safety (CIP safety).

Implementing a Safe Network offers similar benefits to using a standard network over hard wiring. However, there are significant additional advantages:

- The dramatic simplification of wiring because communication can take place over already-installed fieldbus systems.
- The reduction in cabling because a single connection can send a huge amount of data. In the past, for safety information this would have been individual connections with redundancy for high safety levels.
- The ability for designers to have safety information regarding different devices at their fingertips, so that complex systems can be designed, and redesigned, without the need to redraw wiring diagrams.
- Not being limited by I/O on devices.
- Creating a safe communication with devices and hence increasing their functionality and power as peripheral safety nodes.

Let’s consider automated guided vehicles (AGVs). As applications and devices have become more complex and bespoke, the need for greater communication between the safety controller and safety laser scanners has increased. This is because all information is Boolean (on/off) and each signal has previously required a separate cable. What’s more, the safe I/O has been limited to the number of Output Signal Switching Devices (OSSDs). So, if an AGV application is realised using a scanner front and back with 64 field sets, each of which is selected based on the speed derived from encoder signals via a safety PLC, then the required number of individual cables on the AGV, just for safety, could easily be upwards of 50.

Same bus system

Safety device manufacturers, including Sick, have, therefore, introduced their own proprietary safety protocols. Sick’s EFI (Enhanced Function Interface), for example, enables fail-safe communication using the ‘Black Channel’ approach allowing the transmission of both failsafe and standard data on the same bus system. Using EFI, safe communication has a very low probability of dangerous failure and does not normally reduce a system’s integrity, enabling performance levels of up to PLe (EN ISO 13849) and safety integrity levels of up to SIL3 (IEC 62061) to be maintained.

EFI has supported safe communication between Sick safety laser scanners and Sick Flexi Soft controllers for more than a decade. A key benefit was the ability to simultaneously monitor more than one protective field at the same time without having to use multiple OSSD’s each requiring an additional two wires. By having the status of several protective fields available at the same time, the designer could create complex applications involving sequence monitoring, autonomous field switching, self-mutating and safe sequential logic programmes. Another benefit was to transmit inputs to the scanner to switch between field sets without the addition of many wires.

More recently, the release of the Sick Flexi Soft EFI-pro Gateway has enabled open and safe integration via EtherNet/IP based on the CIP Safety protocol. This has allowed connection to devices like the Sick microScan3 safety laser scanner as well as to third party robot controllers from leading manufacturers, remote I/O modules and safety PLCs.
Safe data over one cable
Connecting a safety laser scanner to a safety controller over EFI Pro allows the designer to access all safe and standard data over one cable to create adaptive, scalable modular safety. Field switching, adding multiple scanners or connecting to robots, encoders and other devices with CIP Safety or standard Ethernet on board no longer requires multiple cables and programming tools.

Connected to the Flexi Soft modular controller, EFI Pro provides value-added services on top of Ethernet/IP CIP Safety, such as time synchronisation of multiple devices for advanced diagnostics and data processing. Non-safe communication to any other network facilitates the simultaneous output of data, for example for AGV navigation over the same cable.

As an example, when MasterMover developed its new heavy weight AGV300 Tow, safety was the unequivocal starting point. Each standard MasterMover AGV model uses two Sick microScan3 scanners that communicate via the EFI Pro Gateway (EtherNet/IP CIP Safety) to the Sick Flexi Soft Safety Controller. Using Sick’s Flexi Soft Safety Controller and Sick Safety Designer software provided an ecosystem for MasterMover to confidently integrate their own safety system and achieve an integrated and standards-compliant safety design. Together with Sick’s DFS60 safety encoders, and the Sick Drive Monitor FX3-MOC1, all of these devices are integrated into an application achieving PLe (EN ISO 13849)/SIL2 (EN 62061).

Robot tending
Fanuc robots have worked together with Sick to bridge a gap in connectivity between robot tending an injection moulding machine. 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.

Networks can be used to reduce wiring and increase automation. By additionally implementing Safety over Networks, complex applications can be realised whilst increasing productivity and availability with high levels of diagnostics. The openness of the system makes it a versatile component to help production teams navigate a path to Industry 4.0 and the IIoT.

MORE INFORMATION: www.sick.co.uk
In order to achieve optimal performance from recirculating ball bearing guide systems, an absolutely flat mounting surface and the correct assembly of two parallel running rails are required. In most cases, this means longer installation times, as the assembly areas have to be prepared and the systems set in parallel. Typical manufacturer specifications show that the tolerance of the rail parallelism for a standard bearing (block size 25) with normal block preload is only 0.030mm over the entire travel distance.

Any tension or additional friction caused by assembly inaccuracies will very likely lead to a reduction in system life. The adjustment process for recirculating ball bearing guides can therefore be demanding and time-consuming, especially for longer length systems.

In contrast, HepcoMotion’s linear and ring and track systems with V profile guide technology can be mounted on minimally pre-machined surfaces thanks to their design. Furthermore, HepcoMotion’s axial compensation bearings allow assembly inaccuracies of up to 2.0 mm. HepcoMotion’s V guides can also be combined with standard flat guides and rollers, which allows even larger axial movements. When using linear guide systems such as HepcoMotion’s V guides, assembly is less problematic and up to a few hours shorter. These time savings can be significant, especially on long production lines where several linear systems are used.

Maintenance and downtime costs
Perhaps even more important, however, is to take a look at the costs that can arise from maintenance and downtime. In the packaging industry, for example, downtime costs between £500 and £100,000 per hour are expected. Even where the costs are less significant, machine downtime is something that you want to avoid at all costs. It is therefore advisable to include any subsequent costs that may arise in the decision-making process.

When using a linear guide with a recirculating ball system, both components should be replaced in the event of wear due to the necessary precise fit of carriage and rail. Replacing the entire system, however, is time-consuming and means a longer machine downtime. This is different with HepcoMotion’s V guide system: here, play caused by wear can easily be eliminated by adjusting the eccentric V-groove bearings. Alternatively, the bearings can be exchanged quickly and easily. It is important that the rails do not need to be replaced because their service life is much longer, except for high-frequency short-stroke applications. For example, the four bearings of a normal carriage from the HepcoMotion GV3 system can be replaced in less than 10 minutes. On the other hand, it takes around 30 minutes to replace and readjust a complete recirculating ball system.

Of course, environmental conditions also play a role in the total cost of ownership and should therefore be included in the considerations for or against a recirculating ball system or a V guided linear system. In a recirculating ball system, if dirt or abrasion particles get under the seals or if they are damaged, the inner balls jam and the movement is disturbed. In extreme cases, this can lead to total failure and to longer downtimes because, as shown above, in this case the entire system has to be replaced. In contrast to this, HepcoMotion’s V guide system has a ‘self-cleaning function’ due to the geometry of the contact surface between rail and bearing. In this way, dust, dirt and abrasion are simply constantly wiped off the running surface, and the system also works flawlessly in dirty environments.

Even when bearings have reached the end of their service life, they continue to function. Often, customers only notice that a single V groove bearing is worn out during the planned maintenance and inspection.

Installation time, initial conditions, maintenance costs and environmental conditions are certainly just a few factors that must be considered when selecting a system. What is clear is that it is important to look beyond the initial purchase price and consider the ongoing costs.
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New harmony: the G5-5 harmonic recommendations demand attention

The new G5-5 recommendations on harmonic disturbance are a significant change to the previous G5-4. System integrators and end users must take note to ensure compliance and variable speed drive manufacturers will also need to assist by making their product data available. Wayne Turtill, Product Manager for Variable Speed Drives, Servos and Low Voltage Switchgear at Mitsubishi Electric UK, explains the impact of G5-5.

With the exception of the lightbulb, virtually all equipment that doesn’t draw current in a linear way will create harmonics. This category includes variable speed drives. Harmonic disturbance modifies the current and voltage waveforms and can cause issues from the disruption of electronic controllers to the overheating of switchgear. In the most extreme cases, harmonic disturbance can also result in the complete failure of connected equipment.

More stringent harmonic regulation

The reach of harmonic disruption can even extend past a company’s own location to those who share the power grid, such as sites in proximity using the same common voltage supply (point of common coupling – PCC). For this reason, the Energy Network Association (ENA), the industry body that represents the electricity network in the UK and Ireland, created the Engineering Recommendation (EREC) G5-5, which provides the maximum individual and total harmonic voltage distortion levels applicable to UK distribution networks. The levels guide harmonic assessments and set limits for the connection of non-linear / resonant plant and equipment.

The proliferation of additional connections such as small-scale power generation plants, has increased distortion on the network and as a result the good practices recommended in the Electromagnetic Compatibility Regulations 2016 legislation required an update.

Already in effect, is the latest G5-5 iteration, which supports the updated good practices. Along with Mitsubishi Electric’s system service partner, PQM, the two organisations represented drive and control equipment manufacturers on behalf of GAMBICA, the UK’s control and automation trade association, in the development of G5-5 with the Energy Network Association.

G5-5 defines the roles and responsibilities of all parties relating to harmonic disturbance levels, including network operators as well as network users. The network operator is responsible for coordinating and setting the disturbance levels on its network and the user’s responsibility is to comply with the conditions.

Crucially it is the network operator’s right to enforce the levels detailed in G5-5 and ultimately this means that the network operator can withdraw electrical supply if G5-5 isn’t met.

New harmony: the G5-5 harmonic recommendations demand attention
Scope of G5-5
G5-5 is applicable to both new sites as well as modification to existing sites. G5-5 also includes new levels for planning and compatibility of harmonic distortion. The planning level represents a site’s probability of disturbance within the operator’s electrical network and the compatibility level is the point where equipment failures can occur.

According to G5-5, the network operator specifies a level of voltage distortion at which connected equipment to the supply network is likely to be affected, based on percentage of total harmonic distortion (THD). G5-5 also includes a headroom calculation to determine additional distortion which could be added to the supply above the background level but below the maximum permitted planning levels.

The amount of distortion already generated by other users on the network impacts the headroom value that the operator will allow.

Some allowance has also been made for medium sized sites with their own transformer compared to the previous G5-4 recommendations. Some of the planning levels above 400 V but below 33 kV have increased. There are no explicit current distortion levels set within the document and the level of harmonic current permitted is dependent on the calculated harmonic voltage distortion for a supply and Fault Level.

Amendments to the previous regulation
With G5-5, voltage distortion levels up to 2.5 kHz (50th harmonic) are assessed and equipment that generate higher orders are evaluated up to 5 kHz (100th harmonic), though in the latter case this is highly unlikely to apply to most variable speed drives. A further change for G5-5 also means that equipment that generates a short burst of harmonic distortion such as soft starters are now taken into account, with an allowance of 314 kVA soft start total connected load permitted for 400 V connections.

A key point is that individual items of equipment are not assessed for compliance and that G5-5 is a site standard rather than a product standard. A significant change in practical terms is how the site standard is assessed and G5-5 is significantly more in depth than its predecessor. For example, with G5-4, in general a site with variable speed drives below 28.9 A at the fifth harmonic for a 400 V connection would pass assessment, as would an 11 kV common coupling below 3.9 A at the fifth harmonic. Instead G5-5 divides the voltage assessment over three stages with each divided into subsequent levels.

An additional aspect of this now includes the combination of variable speed drive features, which were not previously taken into account. New to G5-5, the combination of drives with active front end (AFE) or harmonic filters and 6 or 12 pulse systems correspond to different stages of assessment. Mitsubishi Electric and PQM campaigned to ensure that drives without AFE but with active harmonic filters could be recognised as compliant to a G5-5 site-standard, providing that they achieve the same harmonic output as an equivalent drive with AFE. Without this amendment, end users with 6 pulse drives above 22 kVA would have faced a significant challenge to achieve compliance.

Impacts to industry
The implications of G5-5 will span all sectors, particularly the water industry with many sites across the country using high power drives and motors. While this sector is well-versed in harmonic compliance, end users will now have to think more carefully about harmonic assessment. Increasing the volume of equipment and drawing greater power means that considerations over headroom will have to take place as part of a harmonic survey and design. G5-5 also raises the bar for variable speed drive manufacturers who will have to supply more information on the harmonics they generate based on impedance and reactance in order to create an effective model to help consultants and end users achieve compliance.

All this may seem rather daunting but help is at hand and Mitsubishi Electric can provide a consultancy service for end users and system integrators to achieve G5-5 compliance, providing modelling as well as the design and installation of active harmonic filtering to meet the prescribed harmonic level. While the new recommendations provide a greater challenge to achieve, G5-5 is helping to create a better network for all stakeholders concerned.
Infrared temperature guns have become a commonplace safety precaution, with 37 degrees Celsius acting as the entrance pass to many offices, shops and airports. Used to detect if someone is exhibiting Covid-19 symptoms, the guns quickly determine if someone has an elevated skin temperature and should therefore isolate and receive a test. This promptly separates the potentially infected individual from others, providing important safety information. However, fever temperature screening is not the only application where infrared technology helps bring safety.

Infrared detection systems, such as temperature guns, use sensors to pick up radiation in the infrared region of the electromagnetic spectrum. Although infrared cameras use this same technology, they are much more complex. They convert the thermal energy being detected into an electrical signal, which can then be processed to produce an image. The image varies in colour, such as red for hot and blue for cold, depending on the amount of infrared radiation being detected.

Infrared cameras provide critical information in the emergency services. Someone is reported missing in the UK every 90 seconds, so search and rescue services must act quickly to ensure the highest possibility of finding the missing person safe and well. However, manually searching dense areas with little visibility, such as forests and rural areas, can be labour intensive. When time is precious, infrared devices can help searchers quickly scan over large areas.

Search and rescue service teams typically comprise of searchers on the ground and in the skies. From an aerial view, searchers in helicopters can use an attached infrared camera to quickly scan the large area. A missing person will have a much stronger infrared signal than their cool surroundings, so will show up as an easily distinguishable colour on the screen. The coordinates of the missing person can then be reported to the ground team, who can quickly access the area on foot.

The ability to identify the location of an individual using infrared technology is not only used for missing and endangered people. Infrared cameras are also used in the police force to track down suspects. If suspects of a crime recognise that the police are tracking them, they may hide in unusual places, such as on a roof or inside a container. Infrared cameras, along with sniffer dogs, can be used to track down suspects before they escape.

Resolving equipment failure

The emergency services use infrared technology to keep citizens safe, but it can also be applied in industrial settings to safeguard equipment. Industrial equipment must carry out intensive processes, such as cutting and lifting, for a long period of time – particularly with the increased adoption of continuous automation. Uninterrupted production can cause unwelcomed machine faults to arise and industrial equipment to overheat. Overheating can lead to electrical faults or even fire, risking the safety of both the production line and nearby workers. To ensure overheating equipment remains intact, it must be shutdown and the problem rectified. This can involve painstakingly taking apart the machine and conducting several tests until the problem is located.

Instead, an infrared camera can identify the component that’s causing the machine to overheat, which can then be fixed or replaced quickly. This ensures the production line is back up and running as quickly as possible to minimise lost time and maximise productivity.

Getting the right gear

Cameras viewing objects at varying distances need precision zoom and focus functions that are controlled by lenses, which can be precisely adjusted by motors. Motors also control the camera aperture, which is an opening in the lens that controls how much light passes through and falls on the image sensor.

Infrared cameras also require motors for calibration in non-uniformity correction. This is a process where a black shutter is moved across the lens and the camera takes an image. From this image the camera can measure the heat it is producing itself, and so process its own thermal signature out of future photos, as to not interfere with the thermal image of the subject.

Motors used in infrared cameras must meet certain performance requirements. In applications where the camera is handheld, the motor must be lightweight so that the device can be easily carried by the user. In critical applications, such as search and rescue, it is vital that the...
Motors used are reliable and repeatable, as a breakdown could have fatal consequences. Similarly, the motor must be efficient with a low power consumption, to ensure the camera can be used for a long period of time without running out of power.

EMS is the sole UK supplier of Faulhaber motors, which are renowned for a superior power density and high performance. Faulhaber motors are made in a high precision manufacturing process, with accuracy that makes them highly reliable and repeatable. In particular, Faulhaber’s flat 1512 DC gearmotor series delivers continuous torque up to 30mNm while having a diameter of just 15mm.

Temperature guns have become a common safety procedure to prevent the spread of Covid-19, but there are many other applications where infrared technology is important. From finding the lost to identifying equipment faults, infrared cameras bring us valuable information that goes beyond the human eye.

**MORE INFORMATION:**
www.ems-limited.co.uk

(Left) Cameras viewing objects at varying distances need precision zoom and focus functions that are controlled by lenses, which can be precisely adjusted by motors.

(Above) In critical applications, such as search and rescue, it is vital that the motors used are reliable and repeatable, as a breakdown could have fatal consequences.

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Construction site robot ready for outer space

Chiron is a construction robot capable of dynamically lifting loads of 30kg, yet it weighs just 74kg. Similar robotic arms are typically four to five times heavier. A variety of tools can be attached to it, and when doing so only the software has to be modified. For example, two team members have already developed a plaster spray tool, complete with a pump and a special application, which enables the construction site robot to move along a wall and distribute plaster.

Due to time constraints, the team decided not to implement the motorisation it had originally planned, opting instead for a modular solution with four wheels. “ETH uses Item profile technology a lot, so it didn’t take us long to get in touch with the company,” said mechanical engineering student Peter Zhang. “Its technology enables us to react quickly and flexibly. Everything can be extended very easily, which is something we noticed straight away in the project. This is a huge advantage.

The team also added a protective enclosure from Item that provides protection from the tools attached to the robot, such as chainsaws, while also preventing any elements protruding or bursting out if the hydraulics in the robot arm are used improperly.

However, the use of this robot is by no means limited to construction sites. While attending a spectacular event, the team was able to demonstrate what the future could have in store for Chiron. The IGLUNA project took place in the glacier palace of the Matterhorn glacier paradise in Zermatt, where 20 student teams from nine European countries came together at the invitation of the Swiss Space Center and the European Space Agency (ESA). They all arrived with their innovative inventions to investigate how we could make life on the Moon possible for humans.

Towering at a height of 3,883m and extending 15m below the surface, the glacier exhibits extreme conditions similar to those found under the Moon’s surface. The temperature there is a steady -4°C. It therefore takes a truly inventive spirit to make the most of these inhospitable conditions. The spectrum of applications presented ranged from architectural designs for a lunar habitat and ideas for efficient food production to artificial intelligence that adapts to the astronaut’s preferences.

Chiron, which was specially equipped with a chainsaw, was able to fully play to its strengths at the event: “The aim of our project was to demonstrate that a robot can be sent to the Moon to build a structure that will make it possible to establish safe housing. In concrete terms, this involves Chiron using its chainsaw to cut out blocks of ice and putting them together to form ice walls,” Peter explained. Chiron is not yet an autonomous robot. It is operated by humans using a PC interface that offers two options – controlling individual joints to move the robot arm and setting a trajectory for the robot to follow. It then independently calculates how its joints should move. However, there are plans to develop Chiron into an autonomous construction site robot. For example, the team is currently working on software that will enable the robot to detect and pick up stones and assemble them into a structure – all without any human input.

When it comes to their professional futures, the students certainly struck lucky with Chiron: “We can apply a lot of what we’ve learnt in our studies here on a large scale. And the practical experience is worth its weight in gold,” said Peter.

System for filling cardboard boxes

MK Profile Systems was faced with a request from a cosmetics company to design and provide a comprehensive modular system for loading product into boxes whilst still maintaining hygiene requirements. The design had to account for a box filling machine for different tube formats, with a capacity of 200 tubes per minute and 4 boxes per minute.

Chaining of upstream filling stations and integration of the provided scale with NOK out sorting of tubes was also required. Counting of the specified tubes per box was to be implemented via light barriers.

MK’s solution was to provide a complete system with inner open profile grooves for maximum flexibility and outer closed grooves for a smooth, clean surface. Material handling of tubes and boxes was enabled with mk belt conveyors. Timing belt stations with timing belt conveyor, supported with pivot bearings for lowering for weighing. A funnel was included to accommodate a complete box fill quantity if there is a fault. In normal operation this would only be pneumatically closed for a box change.

The end result was a optimal solution for the customer, bespoke to their specific requirements.
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TIME-OF-FLIGHT LASER SENSORS CAN RELIABLY DETECT OBJECTS OF VARIOUS COLOURS AND MATERIALS, BASED ON THE TIME DIFFERENCE BETWEEN THE EMISSION OF LIGHT AND ITS RETURN TO THE SENSOR. HERE, MARTIN WYATT, BUSINESS DEVELOPMENT MANAGER AT CARLO GAVAZZI UK, OUTLINES SOME OF THE BENEFITS AND APPLICATIONS FOR THESE COMPACT DEVICES

How do you detect objects of varying sizes and colours on a conveyor if it is difficult to wire-in a light beam emitter on one side of the belt and a receiver on the opposite side? The easy answer is to use a single Time-of-Flight sensor. Laser Time-of-Flight (ToF) sensors measure the actual time for a single laser pulse to leave the sensor and be reflected from an object back to the sensor’s receiver. Because light travels at a constant speed, the time lapse between the emission of the light pulse and its return to the sensor enables both the presence of an object and its distance from the sensor to be detected and measured. And, because the time taken for the light pulse to be reflected will be either longer or shorter for different sized objects, ToF devices can be used to sense the size of objects on a conveyor, for example.

In addition to stationary production plant applications, ToF devices can also be used as a cost effective alternative to ultrasonic devices on automated guided vehicles (AGVs), or service robots, where they can detect objects in the vehicle’s path. Similarly ToF sensors can be used for automatic door control and other proximity sensing applications. ToF sensors can even be used in car tyre manufacturing plants because, unlike standard photoelectric sensors, the ToF laser sensing technology is virtually unaffected by the tyre’s matt black surface finish. In fact, because laser-based ToF sensors work regardless of the object’s colour or surface characteristics and because the sensors are unaffected by humidity, air pressure and temperature they are ideal for use in food and beverage production facilities.

ToF technology has developed rapidly in the past decade. ToF chips are increasingly used for motion sensing in gaming devices and to aide the autofocus feature of many mobile phone cameras. As a consequence, the controls industry is now reaping the benefits of rapid technological improvements and large scale chip production.

The laser technology used in many ToF devices has advanced significantly too. Carlo Gavazzi’s LD30 Time of Flight photoelectric laser sensor, for example, uses a low power Class 1 infrared laser light source driven by a modulated pulse. This makes it safe under all conditions of normal use because the maximum permissible exposure cannot be exceeded when viewing the laser with the naked eye. The laser enables the LD30 sensor to detect objects of any colour, material and surface finish at distances from 50mm up to 1000mm in a single, compact, cost-effective device.

A major benefit of the LD 30 sensor, for example, is that it can operate in standard I/O mode and, when connected to an IO-Link master, it then switches automatically to IO-Link communication. IO-Link is an open standard communication protocol that allows for the bi-directional exchange of data from the ToF sensor to the IO-Link master device and from the master to the sensing device. Communication is point to point, not on a network, so each ToF sensor talks directly to the IO-Link master controller. This can then transmit the sensor’s data over various networks or fieldbuses to make it available for immediate action or to save it for analysis in the future.

In IO-Link mode, the LD30 sensor becomes an intelligent device, which is easily customisable to meet an OEM’s requirements. Once the sensor is connected to the IO-Link port it enables access to a multitude of configuration parameters and advanced functionalities. These settings can be stored in the master controller and can always be changed if the need occurs, or they can be smoothly transferred to a new sensor in the case of sensor replacement.

The LD30 sensor parameters that are adjustable via the IO-Link interface include:

- Sensing distance and hysteresis
- Sensing mode: single point or two point or window mode
- Timer functions: on-delay, off-delay, one shot leading or trailing edge
- Logic functions: AND, OR, X-OR and SR-FF
- External input
- Logging functions: maximum temperature, minimum temperature, operating hours, operating cycles, power cycles, minutes above maximum temperature, minutes below minimum temperature, etc

Using the LD30 sensor in IO-Link communication mode enables the sensor outputs to be monitored, or its operating parameters to be adjusted from virtually anywhere, to enable operators to make decisions based on real time data from the sensor to help improve efficiencies, minimise downtime and, hence, costs. It also enables problems to be speedily identified and resolved the moment they are detected by the sensor.

Carlo Gavazzi’s LD30 Time of Flight photoelectric laser sensors are independently certified for compliance with CE, UL, ECO LAB, TUV and FDA standards. The compact device measures just 11 x 31.5 x 21 mm and weighs less than 100g making it suitable for use in confined spaces. It is available in both an ABS or in a robust stainless steel IP69 housing in order to withstand high pressure cleaning processes.

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THE BENEFITS AND APPLICATIONS FOR THESE COMPACT DEVICES

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How to reduce cabinet clutter in food production

FOOD MANUFACTURERS CAN ACHIEVE FLEXIBLE PRODUCTION AT MINIMAL LABOUR COSTS, BY ADOPTING AUTOMATION WITHOUT CABINETS. STEPHEN HAYES, MANAGING DIRECTOR OF BECKHOFF AUTOMATION UK, EXPLAINS HOW FOOD PROCESSING OPERATIONS CAN BE RECONFIGURED WITH MACHINES THAT CAN BE TRANSPORTED AND MOVED, MORE EASILY AND FASTER THAN TRADITIONAL MACHINERY

In April 2019, ING Bank’s economics department published its report on technology in the food industry, which discussed how technology helps food manufacturers produce more efficiently for a growing world population. Improving shelf life and food safety revolves around technology, and greater use of machines and software ensures affordability and consistent quality.

The report explains that “the number of robots in the European food industry is well over 30,000, while the number of robots per 10,000 employees rose from 62 in 2013 to 84 in 2017. Although Germany is the largest market, robot density is highest in Sweden, Denmark, the Netherlands and Italy.

From controlling people and machines to fully automated production lines with remote control and monitoring, food production is increasingly in the hands of data analysts and robots. Using robots makes the production process more stable with higher production volume and improved food safety, and less labour-intensive with lower personnel costs.

Robots are increasingly used to cut, move, package, and palletise products, for example. Data technology increases predictability and artificial intelligence contributes towards the streamlined use of production lines. Connected machines mean that processes can be increasingly inspected and controlled remotely.

Food production is changing and adapting with respect to seasonal demand changes, and the growing trend for shorter-run food batches to tie in with promotions or consumer trends. Consumer demand for personalised food products is booming, with brands like Veuve Clicquot, Marmite, Cadbury’s, Johnnie Walker, Green & Black’s, and Quality Street, all weighing in with various offers.

These trends will encourage food manufacturers to be nimble on their feet, and to frequently reconfigure processing lines accordingly. EtherCAT P allows for automation systems to be more transportable as a result of reduced wiring and cabling requirements. It is the backbone of Beckhoff’s automation without cabinets concept.

For example, reduced machine footprint and installation space is a key features of the AMP8000 distributed Servo Drive system, which integrates the servo drive directly into the servomotor. By relocating the power electronics directly into the machine, the space requirements within the control cabinet are reduced to a single coupling module that can supply multiple servo-drives from just one cable via a distribution module.

EtherCAT (Ethernet for control automation technology), the real-time Ethernet technology from Beckhoff, sets new standards where conventional fieldbus systems reach their limits, boasting 1,000 distributed I/O points responding within 30 µs, almost unlimited network size, and optimum vertical integration thanks to Ethernet and internet technologies.

With EtherCAT, the costly Ethernet star topology can be replaced with a simple line or tree structure, without expensive infrastructure components being required. All types of Ethernet devices can be integrated via a switch or switch port. Beckhoff EtherCAT I/O modules with IP 69K protection are designed to withstand cleaning procedures that are common in food and beverage applications.

An Australian food manufacturer for example, previously needed three conventional feed lines, with their corresponding costs and space requirements. With an EtherCAT controller, the 21 servo axes distributed throughout the entire factory are now controlled by just one powerful computer. Information is exchanged over the network so that no ‘spaghetti cabling’ is created and the system can be designed very simply.

MORE INFORMATION: www.beckhoff.co.uk
Eaton has launched its SFX programmable safety controller, an IEC 61508 safety integrity level (SIL) 2 certified controller for stationary and mobile embedded hydraulics system applications. Featuring a rugged mechanical design and unmatched flexibility, the SFX controller gives original equipment manufacturers (OEMs) the ability to develop and certify functionally safe platforms quickly and cost-efficiently.

A key feature of the SFX is its partitioned safety application development environment, which enables changes to control applications without impacting safety function software certifications. Physical separation of the pre-certified safety and application domains minimises the effort needed to introduce new features, as well as the time and expense associated with safety certification. The controller’s configurable I/O and white space facilitates design flexibility and allows for custom safety functions.

“We’re working with OEMs to enhance the safety of mobile off-highway equipment, while meeting the need to deliver the latest and greatest vehicle features,” says Jiri Foukner, product manager for electronic controls and software, hydraulics, at Eaton EMEA. “Unlike other embedded controllers, the SFX controller features a dual-processor architecture that separates safety and non-safety functions. This can help to future-proof certified software, providing more flexibility to evolve vehicle features in accordance with product road maps.”

Eaton says the SFX programmable safety controller excels in durability, reliability and configurability and features market-leading temperature and environmental ratings. This ensures reliable performance in a wide range of operating environments. As an IEC 61508 pre-certified SIL 2 controller, the SFX is the ideal solution for a variety of off-highway steering, work and propel applications, including steer-by-wire and autoguidance systems.

The SFX controller is specifically designed as a supervisory controller for safety-critical hydraulic system solutions. Its embedded diagnostics, safety and control host domains, flexible I/O and CAN-compliance features support system integration with a variety of control devices such as displays, keypads and other user interfaces. Plug-and-play compatibility with Eaton’s HFX controllers also enables simple replacement for equipment upgrades.

More information: www.eaton.com/SFX

High flow and low pressure drop maximises output

Tom Parker has introduced a new range of CEJN safety hose reels for compressed air, water, and electricity. From a safety perspective, the team at CEJN evaluated different reels on the market, looking into injuries suffered by people and harm to the environment. Four areas were highlighted: hose retraction, hose replacement, stop-balls and locking.

The most dangerous aspect of a hose reel is the spring force during rewinding. CEJN’s new safety reel is equipped with a sturdy centrifugal brake in the drum, combined with a strong spring force, giving a slow and steady retraction, which is both safe for the people and objects nearby in the workplace.

Also highlighted were the risks and difficulties of changing a hose. When a casing is opened, severe injury to the user can be caused by the strong embedded tension of the metal spiral within. To combat this, CEJN safety reels feature an encapsulated spring cassette to protect the user if the reel needs to be dismantled. CEJN’s new design no longer requires a user to dismantle the reel to change a hose; meaning the task takes under a minute and is completely safe.

During the product development stage of the safety reel, the design team had one main ambition: to create a reel where flow limitations and pressure drop were virtually eliminated. Now the company says it offers a solution that is almost twice as effective as the standard reel when it comes to performance.

CEJN’s focus on performance aims to create solutions that help customers save money. In addition to perfecting performance in their product design, fittings and transition are optimised to eliminate pressure drop, leakage and system loss, to help maximise tool efficiency. As the hose can be easily changed if damaged, the reel can last much longer than most other reels on the market. By investing in a CEJN safety reel, a product is purchased that will last for years to come.

More information: www.tom-parker.co.uk
Expand the possibilities for autonomous material transport

New HD-1500 Mobile Robot from OMRON with 1500kg Payload Capacity

The 1500kg payload capacity of the HD-1500 from OMRON enables transportation of large automotive components such as car chassis and voluminous pallet size payloads - items that would have traditionally been moved using forklifts.

Control up to 100 mobile robots with different sizes, configurations and payload capacities under one system to automate complex material transport and logistics applications with OMRON’s industry-first Fleet Manager.

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Spirol has introduced a new, high-performance series of moulded-in inserts for plastics assemblies. The rugged design of the Series 63 through hole inserts and Series 65 blind end inserts consists of multiple bands of helical knurls to maximise torque resistance, balanced with radial undercuts to achieve high pull-out (tensile) force. These moulded-in inserts are designed to be placed in the mould cavity prior to plastic injection, and offer exceptional performance due to unrestricted plastic flow into the retention features on the outside diameter of the inserts. These lightweight, lead-free threaded inserts for plastics are manufactured from 2024 grade aluminium which provides the best combination of strength, corrosion resistance, machinability and cost.

MORE INFORMATION: www.spirol.com

Schaeffler has launched its new CONCEPT1 single-point automatic lubricator to the UK market. Engineered to ensure optimal lubrication in a broad range of industrial machines and devices – including electric motors, bearing housings, fans, blowers and pumps – CONCEPT1 eliminates the need for time-consuming manual lubrication procedures, while preventing lubrication mistakes such as over- or under-greasing, which can cause unplanned equipment downtime.

MORE INFORMATION: www.schaeffler.co.uk

Flexible power for undersea lines and tethered drones

The 3kW high voltage (HV) DC power supplies manufactured by Cotek are now available from power conversion specialist Relec Electronics. The flexible AEK 3000 HV Series offers 90 to 264V AC input and a choice of regulated, single outputs (150, 200, 250, 300, and 400V DC). An auxiliary output is selectable from +5V/0.5A or +9V/0.3A. The high efficiency AC-DC converters are supplied in fully enclosed cases, with integrated fans for cooling operation in space-limited applications. Dimensions are just 280 x 170 x 64mm. Models in the series have built-in redundancy.

MORE INFORMATION: www.relec.co.uk
Spring applications
Material considerations

There are a number of factors to take into account in a spring’s application before going ahead with the design and manufacturing process, as Airedale Springs chairman, Tim Parkinson, explains.

A spring’s environment will hugely impact the materials chosen. It’s crucial to consider the application environment because this will impact the final product – for example, if you need a spring for an electronic product, then that spring will probably need to be conductive and/or possess resistance to heat.

Load conditions: The load conditions represent a key consideration: can the spring withstand the stress conditions that it will be put under? The pressure or tension placed on a spring will impact its performance and lifespan, so it’s critical that the spring is made from a durable material capable of meeting these application loads. There are two different types of loads:

- With a static load, which refers to a fixed load that is applied in a gradual manner, the spring only needs to operate for a low number of cycles; its ability to withstand stress in these conditions will depend on the tensile strength of the material.
- A dynamic load consists of a force that is applied varyingly, and it means the spring itself is moving due to the pressure applied.

Materials like hard-drawn steel wire, which are more cost-effective, are suitable for applications where the load applied on the spring is static. Certain families of stainless steels, like the Duplex one, have high tensile strength, which means they can withstand a higher degree of pressure. They are also found in sectors like transportation (rail, cycling, etc). If the spring will be under a dynamic load, it also needs to have good resistance to fatigue – music wire is a good option for that.

Specific temperatures: When choosing materials, it’s also important to consider whether the spring will need to operate in an environment with low or high temperatures. If springs are used in environments with temperatures outside of their recommended levels, they can become damaged, deformed or brittle.

Chrome silicon alloys, for example, are a good option for sectors and applications where heat is a concern, since they can withstand high temperatures; in fact, their working temperatures are usually over 200°C. These alloys are also suitable for high-stress applications, since they have a high degree of fatigue resistance, like fuel injector springs. Low temperatures also require careful material consideration. Industries that work with low temperatures include the energy, agriculture and health sectors, and non-ferrous alloys, such as those containing nickel or the 300 series stainless steels, can perform well in both high and low temperatures.

Nearly all aluminium alloys can also be applied at temperatures around ~45°C while still functioning well, and high-alloy austenitic stainless steels can work at temperature below ~196°C.

Resistance to corrosion: Corrosive environments, like those found in chemical plants or in oil platforms at sea, require the use of materials that can not only withstand repeated use but that can also resist corrosion over time. While no spring – or any other part – will last forever, you have a better chance of maximising its longevity and of ensuring a good performance by selecting the right materials.

Corrosion happens when metal reacts to its surroundings, but some are less susceptible than others. Ideally, you should look for metals and alloys like:

- Cold-drawn copper alloys, which are excellent where good electrical conductivity is required and are also highly resistant to corrosion.
- Nickel alloys and chromium alloys, as they’re often resistant to corrosion in addition to being resistant to wear and tear and oxidation, making them suitable for a wide range of applications.

Hygienic and clinical environments: While this may not apply to everything, industries like the food and medical ones need to take hygiene into consideration. Not only do springs used in these sectors have to be durable and capable of handling high-pressure environments, but they also have to be easy to clean and disinfect, especially in today’s climate.

Stainless steels are suitable for these applications, as they help to keep places clean, reduce the risk of infection and help to save lives.

Magnetic properties: Certain environments require the use of magnetic or non-magnetic materials, so this is another property to consider. High carbon steel is a good example of a material that is widely popular, cost-effective and highly magnetic – however, the alloy has a low degree of resistance to corrosion and should be used in a sealed environment.

If the environment application requires a non-magnetic spring because of the surrounding materials (so nothing oscillate, for instance), then something like aluminium, titanium and bronze, just to name a few, are your best bet.

Weight restrictions: Industries like aerospace need springs and components that are strong, durable and long-lasting, as well as low in weight. In aircraft, every gram count, so materials like aluminium are often the preferred option.

This is because aluminium weighs only 2.7g/cm³, which is around a third of that of steel and allows for vehicles and aircraft to reduce dead-weight and improve energy consumption. A plane with many steel parts would never fly as well or operate as efficiently as one with aluminium components.

There are many material implications when it comes to different application environments, so choosing a spring manufacturer who understands this is vital. Airedale Springs has 75 years of knowledge and expertise, so we’re able to deliver high-quality springs and wire forms to clients in a large number of industries.

More information: www.airedalesprings.co.uk
Consumer wearables, including smart watches and augmented reality glasses, have captured the imagination of many. One important market for wearable devices is medical and healthcare, where they fulfill a diverse range of functions, such as monitoring patient heart rate, oxygen levels, body temperature and respiratory rate. State of the art wearables have good reliability, precision and are compact.

The comfort, flexibility and connectivity of wearables have been made possible through progress in sensor technology, power management and transmitter technology; these advances in wearable technology require improvements to the production process. One important part of the assembly process is the dispensing of materials like adhesives, silicones, thermally and electrically conductive materials and greases.

Dispensing technology is required for numerous functions when manufacturing a wearable device, such as bonding batteries to the housing, the application of conductive pastes for thermal management, and the sealing, encapsulation and bonding of sensors. Many Micro-Electronic-Mechanical Systems (MEMs) are bonded or encapsulated with a suitable adhesive, and materials are also used to coat or underfill processors, attach and bond RF-modules and seal and bond actuators.

When manufacturing a medical device, it is important that all processes are reliable, consistent and can be validated. The industry requires manufacturers to have a good understanding of process variables, and to control them to create a robust procedure across all dispensing processes. Dispensing processes must be done accurately and repeatably.

Dispensing in action
To achieve the level of precision required, manufacturers can opt for progressive pump technology, as it enables true volumetric dispensing. A progressive cavity pump typically consists of a single-helix metal rotor and a double-helix hole in an elastomeric stator, which forms a sequence of small discrete cavities. These cavities progress through the pump as the rotor is turned, transferring the liquid. The output represents true volumetric dispensing – the amount of material is directly proportional to the number of rotations of the rotor, and is not affected by material viscosity, input pressure or ambient temperature.

One example technology is the eco-PEN330 preeflow dispenser, which enables the user to dispense volumes as small as 0.001 µl within 1%, 99% of the time – a high level of repeatability and accuracy. It can be used for low or high viscosity materials, with or without filler content.

Dispensing for diabetes management
Medical wearable devices have huge potential for diabetes management. For example, in the US, the digital diabetes management market size has a compound annual growth rate of around 20%. Examples of technologies include continuous glucose monitoring, smart glucose metres and closed loop systems.

One interesting example comes from a client of ViscoTec India, whose engineers created a closed loop system, consisting of a skin patch that measures blood glucose levels, a device that calculates the required insulin dose, and a smart pump that injects the dose. During the production process, the manufacturer required the precise dispensing of 0.7 microlitres of grease into a gearbox component of the electric motor in the insulin pump. These precise requirements were fulfilled with a preeflow eco-PEN330.

Automating the process
In most wearable production processes, adhesive dispensing is automated to achieve a high degree of repeatability. Once the dispensing technology has been selected, manufacturers can repeat the application of materials with positional accuracy by incorporating a robot or other form of automation. Medical device manufacturers have several options to mechanise the process, which include rotary tables or simple 3-axis benchtop robots, usually at modest cost, right up to multi-axis robots with vision-based control and feedback.

As well as delivering productivity benefits from their speed, consistency and ability to run continuously, automation can enable results not possible manually. They can deliver rapid return on investment, particularly when precision and accuracy-based productivity gains are taken into consideration.

The use of wearable technology in consumer and healthcare applications is now widespread. To produce a compact, reliable and precise device that meets rigorous industry standards, manufacturers require a robust dispensing process. Working with an experienced adhesives and dispensing equipment supplier can help you to invest in suitable technology.

MORE INFORMATION: www.intertronics.co.uk
Generally, the reason threaded assemblies fail is through loss of bolt tension, the main causes of which are relaxation and self-loosening. Self-loosening is caused by any type of dynamic load, such as vibration or changes in temperature, insufficient clamp load and poorly fitting parts. These load changes lead to short-term frictionless situations where the bolt unwinds from the nut. The sum of these very small movements ultimately results in the loosening of the threaded assembly.

There are several different methods of addressing the issue of vibrational self-loosening. Most of them include the use of additional mechanical devices to lock the threaded assembly and maintain the desired clamp load.

Split washers are one of the most common mechanical devices used for this purpose. The washer is squashed flat when the nut is tightened against mounting surface so that its sharp edges dig in to prevent the threaded fastener unwinding. But while it might delay the length of time it takes for the bolt to loosen, it will not permanently prevent it.

The main reason is that the split washer does not solve the gapping issue, the free space remaining between the threads of the nut and the bolt. Additionally, being metal itself, a split washer can cause damage to contact faces and corrode in place.

Another common solution is a double nut. While the second nut does not solve the gapping issue, the free space remaining between the threads of the nut and the bolt. Additionally, being metal itself, a split washer can cause damage to contact faces and corrode in place.

Correct selection
There is now a huge range of thread locking adhesives available, offering differences in viscosity, strength, temperature resistance, cure speed and harness/flexibility. To determine the best one for the job ask yourself three main questions: What's the fastener size? Which strength do I need? And how frequently will the assembly need to be serviced?

Typically, on smaller size fasteners, lower strength grades will work well enough regardless of what kind of vibrational loads they may be subjected to. Also, if you have a high servicing frequency requirement, you'll want to use a lower strength grade as well. For assemblies that get dismantled less frequently, a medium strength product is recommended. It's also possible to secure a threaded assembly that has already been assembled, using a formula with wicking properties that will creep into the assembly and between the already torqued threads.

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MORE INFORMATION: www.henkel.com

Prevent nuts and bolts self-loosening

WHEN THREADED BOLTS, SCREWS AND NUTS COME LOOSE, IT CAN NOT ONLY COMPROMISE THE PERFORMANCE OF YOUR MECHANICAL EQUIPMENT BUT COULD ALSO POSE A SAFETY RISK. WE ASKED THE EXPERTS AT HENKEL ABOUT OPTIONS TO PREVENT SELF-LOOSENING

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More information:
www.henkel.com
AN INNOVATIVE FIELD SHELTER IS DELIVERING AN OFF-GRID COOLING SOLUTION FOR A REMOTE DESERT BASESTATION

A field equipment shelter fitted with fault-tolerant cooling is ensuring the reliability of a wireless communications link that connects instrumentation on a new gas pipeline crossing a Middle Eastern desert to the remote control room. Fabricated from tough glassfibre-reinforced polyester (GRP) materials, the shelter houses a TETRA basestation powered by solar panels – in order to function reliably in an off-grid location some 50 km from the nearest town.

Intertec’s shelter employs a ‘hybrid cooling’ system to safeguard the 56m² shelter’s electronics equipment, and battery power storage compartment – a Zone 1 area. The system consists of a water-based passive cooler assisted by dual-redundant electrically-powered water coolers. This approach combines the intrinsic reliability of passive cooling with active water refrigeration to increase cooling efficiency on hot days.

The system can handle a cooling load of around 1.9 kW, ensuring that even during this Middle Eastern climate’s summer – when ambient temperatures can climb as high as 55°C – interior shelter temperatures will always stay below a worst-case peak of around 35°C. At other times of the year, internal shelter temperatures are maintained far below these levels. The remote location means that the basestation is far from the electricity grid, and must be powered by solar energy. The passive cooling system, based on a water tank with internal and external heat exchangers, exploits the desert climate’s daily temperature swing to store the coolness of the night and use it to moderate internal temperatures during the day. The water circulates around the system by natural convection, without electrical power or moving parts.

**Increased efficiency**

This system alone manages the shelter’s cooling needs during the winter months – typically keeping temperatures at around 18-20°C. The two powered water coolers increase the efficiency of the cooling system during the hottest months – operating in an alternating sequence for fault tolerance – typically maintaining temperatures in the 20-30°C range. Even if both water coolers were to fail, Intertec’s passive system has enough cool water capacity to maintain low shelter temperatures for many days, giving maintenance staff plenty of time to access the remote site and make repairs.

The water coolers are a new variant of Intertec’s novel Hybricool range that operate directly from a DC power supply, making them an efficient solution for solar-powered installations. These cooling units are specially designed to supplement passive coolers operating in process plants, with a heat exchanger element that can be installed inside the water storage tank of a passive cooling system to decrease temperature. This interior element is isolated from the rest of the externally-mounted refrigeration system, making it both an efficient and economic solution for explosion proof applications.

[MORE INFORMATION: www.intertec.info]
Insulation and temperature management in pipes for industrial processing and commercial properties is important all year round. Of course, as the nights draw in and temperatures plummet, facilities managers are often more mindful of the risks of frozen pipes. Lagwell Insulation is a specialist in thermal insulation with many industrial, commercial and public sector customers located around the United Kingdom and Europe. It relies on Spelsberg thermostats to deliver performance and value for many of its frost protection systems.

Iain Irvine, Trace Heating Design Manager for Lagwell Insulation, explains: “Trace heating is critical all year round for many facilities. For example, many of the chemicals involved in industrial processing need to be held within a specific temperature range irrespective of the weather. Having said that, we do see a rise in demand during the winter months as the risk of frozen water pipes shifts trace heating solutions further up the list of priorities.”

Lagwell Insulation designs and installs trace heating systems for new builds as well as providing retro-fit solutions for older facilities. Its expertise spans across sites of all sizes with varying degrees of complexity. Alongside chemical processing and manufacturing facilities, it regularly services commercial and public buildings including hospitals, schools and airports. For many of its frost protection systems it relies on Spelsberg thermostats thanks to the quality of the product and the reliability of the customer service.

Spelsberg’s range of HT Thermostats are turnkey units, housed within the company’s IP66 rated range of TK polycarbonate enclosures. The HT range can be fitted with a number of different thermostats offering operating temperature controls ranging from -10-90 °C, 0-40 °C, 30-120 °C, 35-210 °C and 50-320 °C. In fact, these temperature ranges make them suitable not only for frost protection, but also for a wide range of other duties as well. Iain continues: “We already specified Spelsberg enclosures for use in other systems and have found the quality of customer service, communication and product availability to always be exemplary. It was a common sense decision for me to also specify the HT Thermostats as I know I can depend on my orders arriving on time and I have direct access to technical support if needed.”

MORE INFORMATION: www.spelsberg.co.uk
Almost without exception, industrial environments are hostile spaces for electrical equipment; their components don’t react well to high levels of moisture, dust, and heat in the atmosphere. This sensitivity, in turn, affects plant efficiency and will ultimately lower output and profitability. But moisture, dust and heat don’t need to be a concern provided you implement an effective climate control solution for your equipment.

The first step is to consider what constitutes suitable cooling to meet your needs, bearing in mind that your cooling needs may alter with any future changes to applications within your facility. It’s common for managers, when choosing a cooling solution, to default to air cooling using fans and filters because it’s familiar. While air cooling can be a viable solution, it also has its limitations which must be understood before it’s installed, otherwise you risk creating further problems further down the line.

Air cooling is relatively self-explanatory. The cooling is achieved by passing cooler, outside air across the enclosure’s warmer internal components. However, this simplicity has its shortcomings which should be kept in mind. If at any point the temperature within the facility exceeds the maximum allowable temperature (setpoint) inside of the enclosure, then no cooling will be possible.

A good example of this is during the height of summer when the combination of lots of machinery and high ambient temperatures can cause severe temperature spikes within the factory. These will quickly lead to overheating componentry and unexpected tripping of critical equipment. But this is only an issue if your factory is prone to surges in temperature. For many organisations, there is an acceptable level of general HVAC installed to ‘take the edge’ off the temperature, allowing air cooling to create a protective environment for the equipment within the enclosures.

Dust is a constant irritant within a factory and realistically it can never be fully removed. Even the ‘cleanest’ industrial space will have a base level of detritus within the air which will then be drawn into enclosures if fans are employed. Unfortunately, this dust can get into wire connections or internal component fans and cause havoc over time, either preventing thermal exchange or blocking up and shorting wiring connections.

The best way to prevent dust issues arising is to add a suitable filter medium to your air cooling. Filter mediums (or mats) ‘catch’ particulates before they enter the enclosure. The mats should be replaced on a regular basis to prevent a build-up of dirt which can then ‘choke’ the fan, preventing it from pulling sufficient cooling air into the enclosure.

Liquid cooling
Where traditional air-cooling methods are unviable or simply not especially effective, liquid cooling is an option open to all, and one that is much more effective than air at removing waste heat and reducing the temperature within the enclosure. Liquid cooling, as the name suggests, uses chilled water to perform the cooling of the enclosure. An ‘air to air heat exchanger’ is mounted on the enclosure and connected to an industrial chiller. The chiller cools down heated water from the enclosure to a reasonable temperature before delivering it back to the heat exchanger.

The beauty of liquid cooling is that it is ‘active’ which means that you can make the internal temperature lower than that of the local environment. So even in the height of summer, with the factory in full swing, your electrical equipment will be protected. Many industrial sites already have an operational chilled water supply to service other procedures and equipment. Where this is the case, it can be tapped off and used for enclosure cooling.

Liquid cooling requires hydraulic hoses (cold water in, hot water out) to be connected between the heat exchanger and the chiller. It’s therefore worth giving prior thought to both the enclosure placement and where to run the hoses to ensure the smooth commissioning and operation of the whole system.

Much like the air cooling, regular maintenance of the system is strongly recommended to ensure the cooling equipment can provide years of uninterrupted service.

In summary, both solutions are valid in the right scenario. However, choosing a cooling solution without first considering its operating environment is setting yourself up for less than perfect result. This in turn will have an impact on the overall effectiveness of your chosen cooling solution and the ongoing protection of your critical electrical equipment.

MORE INFORMATION: www.rittal.co.uk
KEB F6 drive controllers allow smooth, cost effective upgrade of high-bay warehouse storage and retrieval machine

KEB Automation has helped a customer in Germany convert its high-bay warehouse storage and retrieval machine from an older generation frequency inverters to the new COMBIVERT F6 drive controller from KEB. The warehouse is owned and operated by a mail order business that was looking for a modern, cost effective retrofit solution that would not require the existing motors to be replaced.

The high-bay warehouse currently comprises of nine aisles. Each aisle has 106 positions along its length (on both sides of the aisle) and 28 positions in height (on both sides). Jorg Buchwald-Hörmchen, PLC technician at the warehouse comments: “The main focus was on costs. Of course other competitors also submitted bids for their products, but the statements from them were always the same, ‘We cannot work with your existing motors’. At KEB, this was not an issue at all from the start. They said it didn’t matter what kind of motor was there, we can run all motors with our COMBIVERT F6.”

With the COMBIVERT F6, users can operate KEB’s own motors as well as a variety of other motor types from different manufacturers. “And that’s how it turned out. It was very easy to get the existing motors working with the inverters using automatic calibration. The aim was to replace only the frequency inverters, from the COMBIVERT F4 series to the F6,” adds Jorg Buchwald-Hörmchen.

The COMBIVERT F6 range of high performance single-axis drive controllers are extremely compact, energy efficient and flexible for a wide variety of control applications in automated, safety-oriented machines. The drives provide optimal motor control in real time, as well as integrated safety functionality. The drive controllers are 100% in-house designed and built by KEB Automation. The drives are available in seven different enclosure sizes and power ranges from 4kW up to 400kW. The drives are air- or liquid-cooled (integral or push-through mounting) and can be customised with a variety of design options to suit the specific application. Safety functionality can be selected in modules to suit the requirements of the machine. In addition to the control of widely-supported motor types such as synchronous, asynchronous, permanent magnet, synchronous reluctance, linear, high-torque motor and high speed motor, the COMBIVERT F6 offers additional functions such as automatic anti-cogging and optimised torque pre-control for linear and non-linear kinematics.

Future-proof storage and retrieval system

KEB Automation’s regional industrial partner Vogel-Hemer assisted the customer by installing the new hardware in the warehouse, including the F6 drive controller, S6 servo drive and a C6 industrial PC. As Manfred Vogel explains: “Using modern drives here is a win-win situation. It is also clearly noticeable in the wallet. For many customers, loss of time is very decisive. Operational safety was also a concern for the customer. The system must run 24/7. The bottom line is that the solution must fit the customer. I think we’ve done an optimal job here. The project proceeded without interruption, everything worked perfectly.”

According to Jorg Buchwald-Hörmchen, the warehouse also relies on a C6 industrial PC from KEB. He explains: “We also work with an interface from KEB, the C6, a small industrial PC. This quickly proved to be cost-neutral. We then simply started a test at our desk to see whether we could connect the new drive controller to our existing control system. This was also successful very quickly and it all worked well. Vogel-Hemer supported us in the hardware installation.”

Security fastener helps prevent businesses becoming victims of crime

A new range of security fasteners has been launched to help businesses to cut the cost of being a victim of crime from their overheads. The innovative 5-lobe pin from TR Fastenings is the first complete range of security fasteners made from corrosion-resistant A4-70 stainless steel – the perfect product for outdoor use, in particular in marine, health and medical sectors because of its non-reactive qualities. The fastener’s five-sectioned screw head means that it can only be undone by someone with specialist tools, preventing its removal by an opportunist criminal.

Paul Standing, product manager at TR Fastenings, said: “Opportunist thieves and vandals are always on the look out for an easy target so it’s vital that businesses have the right level of security to defend themselves and their property. Our new 5-lobe pin fasteners provide a low-cost, long-lasting line of defence against intruders that could cut the amount of money businesses lose in theft, damages, disruption and increased insurance premiums because of crime.”

www.trfastenings.com

Safety and control functions via radio

Whether in bidirectional pair operation or unidirectional group operation, the innovative SAFEMASTER W wireless safety system UH 6900 ensures safe wireless transmission of emergency stop and control functions. The safety system provides greater flexibility in safeguarding hazardous areas as well as improving efficiency and economy. The wireless safety system comes into its own in mobile, AGV and large area installations where wiring is not possible or would be extremely complex.

The PLe / Cat. 4 or SIL 3, TÜV-certified system consists of two or up to 256 compact 45mm wide wireless safety modules. The system has a safety-related bidirectional radio transmission range of 800m in open country and as a result, it achieves a greater availability than other comparable systems.

www.dold.com

Carpanelli motors direct from the manufacturer with cost savings

Carpanelli is describing the ending of its distribution agreement with Lenze as an opportunity for users to get original products straight from the manufacturer with what should be substantial cost savings. Some of the products previously supplied to Lenze would have been in some way special, built with encoders, forced ventilation, special brakes or perhaps with an array of special voltages and UL/CSA or ATEX certification. Users can now get the same service direct. Further, Carpanelli says Lenze has also dropped Hydromec gearboxes from its portfolio. Where customers are looking to replace this supply, Carpanelli says it supplies standard and special motors with and without gearboxes, and can certainly offer the Carpanelli motor with the Hydromec gearbox. Carpanelli supplies many companies in the UK direct from Italy on a 4-5 week lead time, or less for stock orders.

www.carpanelli.co.uk
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An Introduction to Captive Screws

What is a Captive Screw?

A captive screw is a fastener specially designed to remain in place within an assembly when the assembly is removed. In general the captive screw has a thinner diameter shank over the length of the screw, then a larger threaded portion at the end. This means that when you remove a panel by unscrewing the captive screw, it does not come away from the cover itself. This makes there fasteners important when you are using them in safety equipment where you need to avoid loose components.

For example removing a cover panel such as a guard panel from an assembly whilst performing maintenance. The screw is required to remain with the guard so that the guard or cover can be easily replaced.
# An Introduction to Captive Screws

The available head drivers include:

<table>
<thead>
<tr>
<th>Schematic</th>
<th>Drive Types</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Hexagonal Recess" /></td>
<td>Hexagonal Recess</td>
<td>Ideal for precision assembly. Most recommended where less surface area is available.</td>
</tr>
<tr>
<td><img src="image" alt="Crosshead (Phillips®)" /></td>
<td>Crosshead (Phillips®)</td>
<td>Provides good control in driving. Always use a driver bit of the proper size which is in good condition.</td>
</tr>
<tr>
<td><img src="image" alt="Star Head (Torx®)" /></td>
<td>Star Head (Torx®)</td>
<td>Positive-engaging, fast-locating method which transmits drive torque with less required downward pressure. Good fastening appearance.</td>
</tr>
<tr>
<td><img src="image" alt="Slotted" /></td>
<td>Slotted</td>
<td>Accepts standard blade screwdriver. Requires less downward pressure to drive parts than those with recessed openings. Use a proper fitting blade to minimize slippage.</td>
</tr>
<tr>
<td><img src="image" alt="Security" /></td>
<td>Security</td>
<td>These screws are impossible to remove without the special matching screw driver.</td>
</tr>
</tbody>
</table>

## Retaining Washers

These are simple but effective when used with our captive screws. The captive screws have a normal thread and a reduced diameter for the rest of the screw length. The washer is threaded internally and once screwed on to the captive screw is effectively captive. Please see this illustrated below. **Example:**

![Retaining Washer Diagram](image)
Shoulder Screws

What is a Shoulder Screw?

Shoulder screws are also known as shoulder bolts and stripper bolts. Their sizes are normally described by the shoulder diameter x shoulder length. Once installed, the shoulder section, which is slightly larger in diameter to the threaded section, can act as a shaft for rotating bearings to create simple cam followers, pivot points, or for pulley’s and gears.

Manufactured in house, not only do we have large volumes of shoulder screws in stock in a wide variety of styles, materials, and sizes, we are also able to manufacture specials to your bespoke requirements with very quick turnaround times.
# Product Overview of Shoulder Screws

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Material</th>
<th>Head</th>
<th>Corrosion resistance</th>
<th>Strength</th>
<th>Ø/thread</th>
<th>DIN/ISO</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0130</td>
<td>Stainless A2</td>
<td>Hex socket</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>Min: Ø4/M3 Max: Ø12/M10</td>
<td>-</td>
</tr>
<tr>
<td>P0131</td>
<td>Stainless 416</td>
<td>Hex socket</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>Min: Ø4/M3 Max: Ø12/M10</td>
<td>-</td>
</tr>
<tr>
<td>P0132</td>
<td>Stainless A2</td>
<td>Slotted</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>Min: Ø4/M3 Max: Ø12/M10</td>
<td>-</td>
</tr>
<tr>
<td>P0133</td>
<td>Stainless 416</td>
<td>Slotted</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>Min: Ø4/M3 Max: Ø12/M10</td>
<td>-</td>
</tr>
<tr>
<td>P0134</td>
<td>Stainless A2</td>
<td>Hex socket</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>Min: Ø4/M3 Max: Ø8/M6</td>
<td>-</td>
</tr>
<tr>
<td>P0135</td>
<td>Stainless A2</td>
<td>Hex head</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>Min: Ø4/M3 Max: Ø12/M10</td>
<td>-</td>
</tr>
<tr>
<td>P0136</td>
<td>Steel 12,9</td>
<td>Hex socket</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>Min: Ø4/M3 Max: Ø24/M20</td>
<td>ISO 7379</td>
</tr>
<tr>
<td>P0137</td>
<td>Stainless A2</td>
<td>Hex socket</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>Min: Ø6/M5 Max: Ø20/M16</td>
<td>ISO 7379</td>
</tr>
<tr>
<td>P0138</td>
<td>Steel 8,8</td>
<td>Hex head (long thread)</td>
<td>✓ ✓</td>
<td>✓</td>
<td>Min: Ø9/M8 Max: Ø44/M42</td>
<td>DIN 610</td>
</tr>
<tr>
<td>P0139</td>
<td>Steel 10,9</td>
<td>Hex head (long thread)</td>
<td>✓ ✓</td>
<td>✓</td>
<td>Min: Ø9/M8 Max: Ø38/M36</td>
<td>DIN 610</td>
</tr>
<tr>
<td>P0140</td>
<td>Steel 8,8</td>
<td>Hex socket (short thread)</td>
<td>✓ ✓</td>
<td>✓</td>
<td>Min: Ø9/M8 Max: Ø44/M42</td>
<td>DIN 609</td>
</tr>
<tr>
<td>P0141</td>
<td>Steel 10,9</td>
<td>Hex socket (short thread)</td>
<td>✓ ✓</td>
<td>✓</td>
<td>Min: Ø9/M8 Max: Ø38/M36</td>
<td>DIN 609</td>
</tr>
<tr>
<td>P0142</td>
<td>Steel 8,8</td>
<td>Hex head</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>Min: Ø12/M12 Max: Ø27/M27</td>
<td>DIN 7968</td>
</tr>
<tr>
<td>P0143</td>
<td>Stainless A4</td>
<td>Hex socket</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>Min: Ø4/M3 Max: Ø12/M10</td>
<td>ISO 7379</td>
</tr>
<tr>
<td>P0144</td>
<td>Stainless A2</td>
<td>Pan head</td>
<td>✓ ✓ ✓</td>
<td>✓</td>
<td>Min: Ø4/M3 Max: Ø10/M8</td>
<td>DIN 923</td>
</tr>
</tbody>
</table>
What is a Sealing Screw?

An ordinary screw lacks seal protection, allowing dirt, fluids, gases etc. to infiltrate and damage sensitive devices. **Sealing screws provide bi-directional sealing protection to systems where screws are used, to protect them against foreign contaminates**, which, with a standard fastening may penetrate or leak and cause damage.

The seal screws **incorporate an O-ring underneath the screw, bolt etc. which forms a sealant layer.** The seal provides bi-directional sealing. The screws are very easy to use and do not need any special preparation or re-tightening.

Automotion Components self sealing fasteners are designed and manufactured with a precision engineered groove beneath the head of the fastener. As the fastener is tightened, the O-ring is compressed, squeezing the O-ring between the groove and mating surface to complete the seal. The design of the groove controls the amount of compression of the O-ring and because O-rings retain their elastic memory, the screws are reusable time after time. There are a range of O-ring materials that can resist virtually all chemical and environmental conditions. We can also provide sealing screws (on request) to military specifications (MILSPEC).
Vented Screws

What is a Vented Screw?

Vented screws have a hole drilled through the centre to allow for the release of gasses and pressure, typically in vacuum applications.

A blind tapped hole inside a vacuum system leaves residual air space at the bottom that cannot be fully evacuated in the vacuum cycle when a bolt, screw, or other fastener is threaded into the hole. The screw itself is a helix with a large surface area also containing voids of trapped air. This produces virtual leaks. Vented screws and fasteners ensure direct ventilation of these voids, allowing the trapped volumes of air within the threads and at the bottoms of the holes to be fully evacuated. This speeds pump-down and helps improve system performance.
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