Practical sensor integration: Your questions answered

Back to Business Report Part 3

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With my younger daughter back at school, my elder daughter returning to university, Mrs Simms enrolled in a college course of her own, and elderly parents on both sides of the family, we have been paying even more attention to talk on the news of bubbles. With that in mind, I wanted to test a hypothesis. So I asked Mrs Simms and the children to play a word association game with me, responding to a word as quickly as possible, without thinking. The word I gave them was ‘bubble’. My two daughters, as one, shouted back ‘bath’. Mrs Simms, at exactly the same time, called out the name of her preferred bubbly chocolate. I’d have put money on her going with prosecco, but seeing as our fridge is stocked pretty evenly with both, perhaps it’s not a total surprise. Why is this interesting? We know that, through Covid, sales of wine and chocolate were up significantly, and so were beauty products — including the likes of bubble bath. Sales in each category were above the seasonal norm.

My hypothesis is, within each of the categories of wine, chocolate and beauty products, that sales of bubbly chocolate, sparkling wine and bubble bath ought to be proportionally higher than other products within their given category, due to the subliminal marketing effects of six months’ ongoing discussion about bubbles. And the responses in my word association test suggests that there might be something to it, and that perhaps subliminal messaging could be at work. Admittedly it wasn’t a very scientific test, but, in its favour, no relatives were harmed in the process.

Subliminal advertising has been banned in the UK since 1957, although psychologists are split on whether it has any real impact on buying habits at all. But there is no doubt that talking about something frequently, keeping the conversation going on a particular topic, keeps it front and centre in the mind when it comes time to purchase: that’s the well established ‘availability heuristic’. And with that comes opportunities to grow business as we emerge from the Covid-19 crisis, by ensuring that we are talking to customers about the issues that are going to impact them most strongly going forward, so that ours are the names they bring to mind when they’re ready to make their investment.

Mark Simms
Editor
SMATER SENSORS
the challenging environment of the food industry and increasing user expectations mean that the future belongs to smart sensors that not only offer outstanding performance and reliability, but also deliver substantial added value.

AUTOMATIC TURNING
After only two years of development time, DMG Mori ushers in a new era of automatic turning machines with multiple spindles. The current MULTISPRINT series represents a technological revolution in automatic turning.

Vola, a Danish manufacturer of luxury sanitary and kitchen fittings, has opened a new factory that incorporates a fleet of nine mobile robots from Omron, working side by side with people.

Light Revolution, a lighting and camera system manufacturer for the film, photography and photogrammetry industry, with the support of EMS, has taken the concept of painting with light straight into the 21st century.

HepcoMotion’s ‘Fit and Forget’ actuators provide a low maintenance solution in a high duty bread manufacturing application, helping the customer stay one step ahead of the competition.

The global manufacturing outlook is mixed, but the UK is predicted to fare badly, according to new research. Further, the aerospace sector will be hard hit and the slowest to recover.

How can industry attract the investment necessary to make Industry 4.0 a reality? We examine an initiative aimed at doing exactly that.

Challenged manufacturers seek more IT agility as business returns. The solution lies in upgraded ERP systems, and could help manufacturers to initiate recovery quickly.

Cobots are key to the future of manufacturing, enhancing production efficiency, flexibility and quality with the help of camera and vision technology.

ON THE FRONT COVER
Sick’s Charlie Walker outlines the tools needed for sensor integration and how they can be used to enable rapid process improvements.
DC DRIVE FOR RAILWAY PROJECT

Motor Control Warehouse, on behalf of Aberystwyth Cliff Railway, had a challenge to solve. The company realised the railway’s control system was becoming harder to maintain due to components being made obsolete.

TIME FOR CHANGE WITH THE NEW G5/5 REGULATIONS

BESPOKE BATTERY STRATEGY

There are a number of factors that businesses should take into account to identify which lithium-ion setup is the most appropriate for their application, as Jon Divers, customer service director at Jungheinrich, explains.

CYBER SECURITY

Interconnected devices, systems and processes open a wealth of opportunities for manufacturers, but they also presents cyber weaknesses.

Be it an industrial robot or the servo axes in a medical machine, moved loads must not drop or crash in an uncontrolled manner after power switch-off or in the case of power failure or an emergency stop.

A customised charging station, provided by Fronius, has recently been installed as a power supply for the forklift trucks at Jowa’s regional bakery at Gossau, St Gallen.

32  Automatic sorting solutions from Interroll now include a new high-performance system capable of handling up to 20,000 conveyed goods per hour.

34  Bulk material-handling equipment uses RFID technology to sense the position of large rail-mounted reclamation conveyors operating in a hot, dusty environment.

Augmented Reality promises a step change in the way process industries think about maintenance, supercharging the already formidable power of Predictive Maintenance. David Lincoln, of ABB Measurement & Analytics explains how.
Global manufacturing outlook is mixed, but UK fares badly

The UK manufacturing sector is set to be amongst the slowest regions to recover from the Covid-19 pandemic, and aerospace production will be one of the slowest industries to recover to 2019 levels – the only sector not to have recovered to 100% of its 2019 MIO output by 2024. These are among the findings of new research by Interact Analysis.

Giving an up-to-date outlook on the output of the entire global manufacturing industry, including significant data from the Covid period, the research allows the most accurate possible forecast for the impact of Coronavirus on global manufacturing. The research covers 35 industries and machinery sectors and shows a detailed picture at the sector level.

The commercial vehicle sector and the electric and electronic equipment sector are both predicted to recover much faster than previously thought, while other sectors will be very hard hit for the long term. From a regional perspective, most countries will surpass 2019 levels of production by 2024.

A total of 38 regions are covered, with detailed data for all industry sectors in Australia available for the first time. The US and China are predicted to recover more quickly than other regions and while Brazil, India and the UK are set to be amongst the slowest to recover. The reason for the slow recoveries for both Brazil and India is primarily due to the highly alarming degree of infection growth in both countries and relative absence of a financial stimulus. Meanwhile, the US is expected to recover well despite its high level of infections due to the unprecedentedly large financial stimulus being applied in the country, to reduce the economic impact. The level of debt be accrued could be problematic in the long term, but probably not within the range of the five year forecast where it will be mostly beneficial.

In China, a particularly fast return to normality – with the country’s 2020 manufacturing output coming the closest of all to recovering to 2019 levels – is under way because extremely strong measures have been taken to combat the virus. These measures include such things as apps that track the movement of every individual. Such measures are unlikely to be politically acceptable in many other countries, so this extremely fast recovery is unlikely to be replicated elsewhere.

The UK has now recorded the highest deaths in Europe however it has dropped to twelfth in total cases. While a rigorous lockdown process was in place, measures have slowly been eased to allow the economy to get back on its feet however it’s unclear whether this is premature. Looking at key forecast factors, Interact Analysis suggests the UK is an ‘in-between’ case. While the number of instances of Covid-19 infection are high relative to some European countries, the right measures were in place and the economy is slowly being allowed to reopen. The big question for the UK is whether it can avoid a second wave which could prove disastrous for the overall economy.

Brexit also continues to loom. An EU agreement is needed by the end of the year to minimise disruption. The Covid-19 crisis continues to severely distract from the substantial work needed to execute Brexit in a manner that reduces risk to the economy, and Interact Analysis anticipates that this will continue to pull down the short to mid term outlook for the region.

Looking at the impact on manufacturing, Interact Analysis forecasts that there will be negative growth through 2020 (-10%) in the UK, with a return to growth (+3.3%) in 2021 as the economy recovers.
APPLICATIONS TO ENGINEERING JOBS DROP BY 9.9% IN AUGUST

According to the latest job market data from independent job board, CV-Library reveals that applications to engineering jobs fell by 9.9% in August, despite the amount of jobs being advertised increasing by a steady 2.8% month-on-month. The job board analysed data from its site throughout the month of August and compared the findings with data from August 2019 and July 2020, to build an understanding of how the UK job market is fairing right now.

The findings show that job numbers are still significantly lower than in 2019, with engineering roles dropping by a staggering 51.5% year-on-year. However, the amount of job applications made to engineering roles in August was 25.8% higher than it was a year ago; with the application to job ratio increasing by 159.1% year-on-year.

Lee Biggins, founder and CEO of CV-Library comments: “It’s surprising that applications have dropped so significantly; especially given that the government’s Job Retention Scheme is coming to an end in a matter of weeks now. However, it’s important to remember that August is typically a slower month for hiring – even during a pandemic. It’s vital that employers don’t lose faith in the job market. While applications have dropped on the previous month, businesses should continue with their hiring efforts throughout September, and we should see some improvement in the coming weeks.”

Alongside this, the findings show that average salaries for new engineering roles have risen by a promising 5.9% year-on-year, and by 0.7% month-on-month. This is despite salaries dropping by 1.5% across the UK month-on-month.

Biggins continues: “Whatever people’s age or circumstance, September tends to come with a ‘back to school’ feeling, where many job seekers will refocus their efforts on finding a new role. If you’re hiring this month, you can expect to see application figures jump back up; especially if you’re able to offer higher pay, which is a rarity in the current market.”

£300m funding to boost UK manufacturing productivity

BUSINESSES WITH CREATIVE IDEAS TO BOOST UK’S MANUFACTURING CAPACITIES SET TO RECEIVE £300 MILLION OF JOINT FUNDING

Businesses with creative ideas to boost the UK’s manufacturing capabilities, including using robotics, AI and augmented reality, are set to receive £300m of joint government and industry funding, Business Secretary Alok Sharma confirmed at London Tech Week today (11 September 2020).

Through the Manufacturing Made Smarter Challenge, the government will invest £147 million – backed by further funding from industry – to support businesses implement new tech to boost their manufacturing productivity, helping them reach new customers, create thousands of new highly skilled jobs, slash carbon emissions and reduce prices for consumers.

The first £50 million of the funding is being allocated to fourteen cutting-edge manufacturing projects involving around 30 small or medium businesses, 29 larger enterprises and nine universities, with the rest of the funds due over the next five years.

Business Secretary Alok Sharma said: “Increasing productivity is vital for any business, and having the right new technologies in place can help manufacturers make better products to compete and thrive. By helping manufacturers to reduce costs, cut waste, and slash the time it takes to develop their products, this multi-million pound uplift will help fire up the cylinders of productivity as we build back better from the pandemic.”

Chris Courtney, challenge director for Made Smarter at UK Research and Innovation, said: “Digital technologies have the power to radically transform how we manufacture and deliver the products and services of today and the future and I am delighted that we have managed to secure the funding for this vital programme. Our ambition is to support the UK to become a leader in the manufacturing industry and the development of the next generation of technology solutions that will shape how the world works.

“While Covid challenges all sectors are facing only underline the vital importance of manufacturing in the UK across all sectors. There are enormous opportunities to innovate in this area, we have world leading industries, a powerful scientific and research community, a vibrant technology sector and I’m excited to see how this powerful coalition transforms the future of manufacturing.”

Hamid Mughal, MMS Industrial Advisory Group chair added: “We have tremendous manufacturing capability in the UK and recent events have reinforced the importance of strengthening this sector for national resilience and economic growth. Rapid advances in Digital and disruptive Manufacturing technologies provide us with the perfect opportunity to shape this outcome.

“By harnessing the potential of this technology, we will be able to make a transformational improvement in productivity, sustainability and global competitiveness and create new products and services that forge modern digital enterprises. This programme is a key step forward as it will help UK Manufacturing companies to jointly address this challenge and develop cost-effective digital solutions for deployment in our Manufacturing Sector.”

The Manufacturing Made Smarter programme will also support technology SMEs through growth accelerators – partnerships between the government and the private sector where experts will work with businesses to identify barriers to growth and ways to overcome them. It will also create a national network of innovation ‘hubs’ where businesses can partner or share advice.

This announcement follows the opening of a competition in July under Manufacturing Made Smarter: Digital Supply Chain, where firms of all sizes can apply for up to 70% of the funding they need for industrial research projects. The government has committed to raising productivity and earning power in the UK by spending 2.4% of GDP on R&D by 2027.
Making digitalisation and Industry 4.0 a physical reality

HOW CAN INDUSTRY ATTRACT THE INVESTMENT NECESSARY TO MAKE INDUSTRY 4.0 A REALITY? INDUSTRIAL TECHNOLOGY INVESTIGATES

The global manufacturing industry spends a great deal of time and effort discussing digitalisation and how it will affect production in the future. However, many of the ideas and principles remain abstract, and it is often difficult to portray the many facets of digitalisation in manufacturing in one place. “The need to give assurance to procurement teams and the C-suite that their investment in Industry 4.0 and digitalisation is not just a leap of faith but a sound business decision is a practical dilemma for many an engineer or operations manager,” says Steve Sands, head of product management at Festo GB. The company has taken steps to address this problem by developing a 5m long production line, named ‘The Productivity Master’, that attempts to bring often abstract ideas into reality (see panel).

The objective of the Productivity Master is not to focus on any single product from Festo, but to showcase Industry 4.0 technology and connectivity capability. So, not only can the machine demonstrate the seamless connectivity needed to meet the needs of the future factory, it will also reach into the cloud and explore the world of digital twins, multiple communication networking, big data and online cloud diagnostics.

Sands says: “While the factory of the future will stretch the boundaries of connectivity, big data, virtual commissioning and Artificial Intelligence (AI), what will not change much is the way factories will make or assemble products. So, we chose a demonstration application which contains representative tasks that are easily transferred into other industrial applications.”

The Productivity Master takes blank USB memory sticks from typical cassettes and prints and places labels on both sides of the stick. It then loads a custom set of data on the stick and distributes the stick to the recipient from its buffer storage location. Many typical machine functions can be seen throughout the process, such as pick and place, component flipping, rotation functions, rotary table control, vacuum and gripper handling, typical label printing and placement, magazine indexing, storage location logging, vision sensing, orientation checking and placement’ and component transfer.

With cloud connectivity, the Productivity Master is an ideal showcase to demonstrate the advantages of the virtual world on a physical machine. The machine operates a fully automated ‘lot size one’ process, allowing orders for USB memory sticks to be fulfilled online from anywhere in the world, producing a customised QR code for the personalised stick. The user can then redeem their order from the cloud, via the screen or by scanning their QR code on a Festo Vision Sensor on an exhibition stand. The USB stick will then be produced immediately, printed with the users’ personal message, loaded with digital signals and errors. Air pressure and air temperature, current and speeds of servos, analogue and historical data can be viewed without any programming or set up, due to the preconfigured nature of the dashboards.

“With cloud connectivity, the Productivity Master is an ideal showcase to demonstrate the advantages of the virtual world on a physical machine. The machine operates a fully automated ‘lot size one’ process, allowing orders for USB memory sticks to be fulfilled online from anywhere in the world, producing a customised QR code for the personalised stick. The user can then redeem their order from the cloud, via the screen or by scanning their QR code on a Festo Vision Sensor on an exhibition stand. The USB stick will then be produced immediately, printed with the users’ personal message, loaded with digital signals and errors. Air pressure and air temperature, current and speeds of servos, analogue and historical data can be viewed without any programming or set up, due to the preconfigured nature of the dashboards.

The Productivity Master also takes advantage of the Festo Dashboards in the cloud. The CPX automation platform, pneumatic service units and servo drives are all connected to the virtual world via the IoT gateway. Operators can immediately gain access to the most important data generated by the machine: such as temperature, current and speeds of servos, analogue and digital signals and errors. Air pressure and air consumption can also be monitored and changes logged, enabling prediction of potential problems in the future. Data can be accessed anywhere in the world and both live and historical data can be viewed without any programming or set up, due to the preconfigured nature of the dashboards.

“There is a real need to find ways of making Industry 4.0 and digitalisation concepts far more understandable and accessible if we are to encourage the levels of investment required to equip our factories for the future,” observes Sands. “Festo’s Productivity Master demonstrates how many different technologies that are already available can be combined to achieve major improvements in automation, operations and maintenance.”

By bringing typical application examples onto the Productivity Master, Festo aims to make it easier for all those involved in the decision-making process to associate Industry 4.0 and digitalisation to real life and therefore see how future digitalisation principles can be applied to production lines today.

MORE INFORMATION: www.festo.co.uk
G5/5 regulations bring important changes for VSD installations

With the exception of the light bulb, virtually every electronic device will generate harmonics of some description. And when we consider non-linear loads such as variable speed drives, the harmonics they generate can be enough to disrupt the operation of other devices connected to the supply.

Recognising that there are increasing numbers of non-linear loads looking to be connected, the regulations governing their connection have been updated, with Engineering Recommendation (EREC) G5/5 superceding G5/4 as of June this year.

Wayne Turtill, product manager for variable speed drives, servos and low voltage at Mitsubishi Electric, says: “G5/5 is applicable for all new users and supply applications and modifications. The network operator (NO) is responsible for the overall coordination of the disturbance levels on its network and for assessing the impact of the new user’s relevant equipment. The user is responsible for complying with the conditions the NO places on them to comply with this engineering recommendation.”

G5/5 considers voltage distortion levels of up 2.5kHz (the 50th harmonic) as standard, while equipment generating high harmonic orders or ‘interharmonics’ may require an assessment up to 5kHz (the 100th harmonic). For VSD users, Turtill notes: "Off-the-shelf VSD are very unlikely to cause interharmonic issues."

He adds: “G5/5 also sees the NO specifying a level of voltage distortion at which equipment connected to the supply is likely to be affected. If you have 8% or more voltage distortion at 400V, your equipment is more likely to fail.” There are no explicit current distortion levels set within the document. The level of harmonic current permitted is dependent on the calculated voltage distortion for a supply voltage and fault level.

Along with variable speed drives, the changes in G5/5 mean it now considers soft starters as well. “G5/4 did not, so in theory you could have added any number of soft starters to the system,” comments Turtill. “In G5/5 soft starters have to be included in the calculation.”

The assessment process has also been updated, maintaining the three-stage approach of G5/4 but breaking these stages down further. And Turtill comments: “You have to do your assessment calculations based on the technology you are using. Equipment up to 16A per phase and compliant with BS 61000-3-2 can be added freely, but does add to total loading.”

Stage 1 assessments are still reserved for LV connections and are generally only suitable for small loads. Stage 2 considers connection of systems greater than LV but less than 33kV, or equipment exceeded in the Stage 1 assessment or where the limits cannot be met. Turtill notes: “Measurement of the background distortion is required for existing sites.”

There may be a need for a Stage 3 assessment or calculation if the values exceed the specified limits. Failure at this stage requires mitigation and/or a higher PCC. Where any proposed equipment could affect the network with voltage distortion greater than planning levels, the NO can refuse connection until a solution is agreed.

“You have to remember that the network operator is both judge and jury, and their decision is final,” comments Turtill. “They don’t have to grant you a connection.”

He stresses that Mitsubishi Electric is there to help. “Mitsubishi Electric can offer full harmonic surveys that benchmark harmonic content, provide information on where and when energy is being used, and a seven day survey compliant with G5/5 using compliant metering,” he says. “And we can offer the recommendations if any mitigation is required and identify potential energy savings.

“Once we know your issues, we can offer products to help mitigate the problem. It may be as simple as fitting a choke to your non-linear load. This can as much as halve the generated distortion from an inverter and is a very cost-effective solution.

“If you need something larger, we can escalate the solution to fit an active filtration system, not only mitigating new loads but also cleaning up potential issues that are already impacting the site.”

MORE INFO: gb3a.mitsubishielectric.com
Manufacturers first in, can be first out of pandemic downturn

CHALLENGED MANUFACTURERS SEEK MORE IT AGILITY AS BUSINESS RETURNS. THE SOLUTION LIES IN UPGRADED ERP SYSTEMS, AND THIS COULD MAKE MANUFACTURING ONE OF THE FIRST SECTORS TO INITIATE RECOVERY

Boomi, a Dell Technologies business, has revealed results from its ERP Innovator’s Dilemma report, which finds manufacturers investing in modernising legacy ERP systems. It finds upgrading the complex systems at the root of manufacturing operations reduces “keep the lights on” spending, to just 35%. This has enabled manufacturers to increase innovation budgets to 32%, allowing further IT innovation – vital in these challenging economic times – and further modernization, 33%.

With manufacturing one of the first sectors to return to work, preparing this vital sector for recovery has never been more critical. As manufacturing leaders search for a way to withstand today’s fractured supply chains, depressed demand, workforce safety and the widespread uncertainty, modernising legacy ERP systems offers a way to increase agility and avoid a prolonged financial slump.

Modernising ERP systems lowers costs of “keeping the lights on”, according to manufacturers, which until recent years claimed 75% of IT budgets, simply to maintain operations. Upgraded ERP applications are now allowing manufacturers to drop this to 35%, and free the remainder for innovation (32%), while continuing to modernise further applications (33%).

As they amp up modernisation efforts, manufacturers are investing in the consolidation and standardisation of their applications, according to 87%, against an average of 76%, followed by migrating their infrastructure to the cloud, in which the sector follows the average of 75%. The sector is also ahead of the average in consolidating legacy IT infrastructure, with 72% against 69%.

Boomi’s research shows manufacturers are coping with complex hybrid IT environments better than other sectors, with less than half (46%) citing it as a primary challenge, against the average of 56%. A more pressing issue for manufacturers is the changing business requirements for the sector (53), which concerns 39% of respondents.

The business drivers pushing manufacturers to lift and shift their ERP systems to the cloud also differ from other sectors. Gaining IT agility takes first place with 57% versus the average of 53%, while assurance lies at 53%, lower than the total of 57%. Driving business growth is also more of a priority in terms of ERP modernisation for manufacturers, 55% against an average of 53%.

Manufacturers also differ from the average in the reasons behind ERP modernisation projects failing to deliver as expected. The manufacturing C-Suite is more well-disposed to systems modernisation, with 41% of respondents citing the lack of senior buy-in as a problem, against the average of 48%. The real issue appears to be the lack of proper governance, which 63% identify as a challenge, while the average lies at 53%.

Some integration challenges weigh more heavily on the manufacturing sector than others: the lack of integration technologies able to ingest data from any source (66%) surpasses the average of 51%, while organisations are also struggling to find integration professionals who can understand business processes (46%), a shortage which affects just 39% of the total. It’s a crucial problem to address for the sector, as it focuses on integration and orchestration strategies to create the best customer experiences (59% – above the average of 52%).

Red tape is key barrier to cybersecurity

The recent Kaspersky report ‘State of industrial cybersecurity in the era of digitalisation’ has revealed the main barriers that inhibit or delay implementation of industrial cybersecurity projects. The most common obstacles include the inability to stop production (34%), and bureaucratic steps, such as a lengthy approval process (31%) and having too many decision-makers (23%). These barriers may become a critical point in light of Covid-19 because they can affect the implementation of pandemic-driven operational technology (OT) security initiatives.

The cybersecurity race doesn’t slow down, and every year many incidents, including high-profile attacks, hit industrial control systems. The pandemic lockdown introduced its own challenges in addition to the existing threat landscape. Industrial firms have to adapt to new norms including remote work, overnight digitalisation and new hygiene requirements, as well as specific pandemic-driven threats such as a massive growth in phishing attacks. Organisations need to make sure their protection is up to date with these changes and there are no open doors for malicious actions in ICS networks.

The above barriers however are what organisations will have to overcome when implementing cybersecurity projects. Remarkably, most of them refer to bureaucratic rather than technical obstacles – in total, almost half of organisations (46%) face red tape delays. In addition to the most prevalent – long approval times and numerous decision-makers – these barriers include protracted supplier selection and purchasing processes, as well as interference from other departments.

These barriers may become even more critical in the current post-lockdown period. The survey revealed that almost half of organisations (46%) expect to see changes in their OT security priorities as a result of the pandemic. These organisations will probably need to shift their security strategy on-the-fly and quickly implement new cybersecurity practices. While it can be challenging generally, due to the specific requirements of OT, the barriers for implementation can complicate and slow down the process even more. Some organisations will need to be even more conscious as they try to overcome these difficulties with decreased OT security budgets (24%).

“It’s always more difficult to invest money and resources in projects without a clear return on investment, such as with cybersecurity initiatives,” commented Georgy Shebuldaev, head of growth centre at Kaspersky. “And while cybersecurity for OT is still a developing area, all these management barriers are quite natural. As a vendor, it is up to us to help customers eliminate these obstacles and simplify and speed up the implementation of protection measures. Our task here is to make ROI more transparent and showcase the risks for businesses so customers can understand the benefits from the very beginning and better justify them to C-suite or the board if needed.”
DAVID LINCOLN, OF ABB MEASUREMENT & ANALYTICS EXPLAINS HOW THE ALREADY FORMIDABLE POWER OF PREDICTIVE MAINTENANCE, AUGMENTED REALITY PROMISES A STEP CHANGE IN THE WAY PROCESS INDUSTRIES THINK ABOUT MAINTENANCE, SUPERCHARGING THE ALREADY FORMIDABLE POWER OF PREDICTIVE MAINTENANCE.

AUGMENTED REALITY PROMISES A STEP CHANGE IN THE WAY PROCESS INDUSTRIES THINK ABOUT MAINTENANCE, SUPERCHARGING THE ALREADY FORMIDABLE POWER OF PREDICTIVE MAINTENANCE.

David Lincoln, of ABB Measurement & Analytics explains how in the realm of digital technologies, Augmented Reality (AR) certainly stands out. Overlaying digital data on what you are seeing in the real world, rather like the head up display in a combat aircraft, has uses that really jump out, with one of its biggest uses is expected to be in Predictive Maintenance (PM). Using data from devices or processes to detect trends or analyse patterns, to predict when an asset will need servicing. The result is better, more planned use of your maintenance staff, a minimum of lost production and lower costs.

PM is already a game changer. Many processes still rely on disconnected devices, offering no monitoring of diagnostics at all. The most operators can expect is an alarm to indicate that something has gone outside its normal range – depending on the severity of the problem, the device might just stop communicating or cease working altogether. When the operator realises that the device is not working, they will call a field service centre, who spend further time to identify the device and provide details of it. The result is that someone is dispatched to site with no knowledge of what the problem is and whether they have the right parts to do the fix.

Next level maintenance

With its power to identify when you need to do something, PM is increasingly essential - either manually using people’s expertise to define a problem and when it will occur, or automatically using analysis of data. AR in the context of Predictive Maintenance is part of the growing trend towards autonomous systems – a device being monitored and a problem being detected within or around the device automatically. The root cause of the problem is automatically worked out, the timeframe within which a problem would occur is calculated and the way to perform the fix automatically provided.

AR can be operated in two ways, in either a manual system or a fully automated system. A manual system would involve an expert, who guides the engineer through the process via a remote channel and describes how to make the fix. In a fully automated system, the AR would be driven by the AI prescribing what the problem is – it would then provide the user with the procedure and process, presenting instructions and maintenance information graphically via an iPad or some type of projecting lens. The system may also automatically dispatch a spare part if required.

When it comes to fixing a problem, there are essentially two scenarios. The first is where the customer carries out the work. In this scenario, the spare part is automatically dispatched, and the customer is informed how to do the fix. Alternatively, the PM solution creates a case which is automatically filled by an ABB service engineer, who is provided with the part and goes to the site with an AR app and performs the task.

Using AR and its supporting applications and systems has two major benefits. The first is a reduction in the number of touch points that can potentially go wrong. This way of working also moves the plant from a situation where events are uncontrolled or unscheduled, to one where we have a plan based on the knowledge that certain components will need to be repaired or replaced at a particular time. The PM approach reduces the time needed to get a plant back into operation and improves safety by not putting the plant into an unknown condition.

As issues such as skills shortages, remote locations and staff absence affect the ability of companies to keep their systems up and running, AR is set to become increasingly common. Many countries have plants that are difficult to get to and even well-populated countries have their share of remote locations. There will most likely be a combination of factors that will drive the adoption of AR: the way that different generations access information and use devices, shifts in behaviour and technology will all contribute. We have seen technology go from disconnect-ed devices to connected, then move from monitoring to condition monitoring, then to predictive maintenance as people understand what the data is showing them.

The most recent development has been prescriptive. This is a fundamental part of the AR concept, with applications explaining what you need to do – ultimately, we may well see a move to autonomous maintenance, with the fix itself even being automatic, possibly even self-fixing devices. In some respects, SIL safety protocols are about looking at failure mechanisms within systems and having built in redundancy, so you can deal with unplanned errors. Eventually, redundancy may well be virtualised, with software based virtual flow measurement that allows you to infer flow even when your flow installation stops working.

Once we overcome the barriers to its adoption, making it easy to use and widely accepted by industry, AR is bound for a big future as part of the maintenance landscape of process plants – with its promise of faster, easier fixes, saving time, money and effort, it can’t fail to play a significant role in improving efficiency and safety.

MORE INFORMATION: WWW.ABB.COM
The future of manufacturing

COBOTS ARE KEY TO THE FUTURE OF MANUFACTURING, ENHANCING PRODUCTION EFFICIENCY, FLEXIBILITY AND QUALITY WITH THE HELP OF CAMERA AND VISION TECHNOLOGY, SAYS OMRON’S PETER LANGE

Collaborative robots (cobots) have a key role in current and future trends in industrial automation and production. Recent studies assume that the value of cobots in industrial automation will have reached US$7 billion by 2025. With the average retail price of a cobot being between US$15,000 and US$45,000, their use in this type of automation is also becoming increasingly feasible for industrial manufacturing applications in smaller production facilities and warehouses.

However, companies that are developing innovative and integrated cobot concepts must meet a wide range of requirements. To increase production flexibility, efficiency and quality, they will need to carefully develop the interaction between mobile robots, cobots and other elements – such as integrated apps, support and risk assessment, and camera and vision technology. But what key aspects do companies need to consider and what are the best ways of using smart camera and image processing systems with cobots?

For applications in which flexibility and quality are more important than speed, cobots can be combined with user-friendly software tools and integrated sensor functions. Examples include machine vision systems that have localisation options. Some cobots can navigate using a landmark tool. The marking is easily recognised by the robot’s built-in camera and can be used as a reference point for its movements. This enables it to know how to move to the correct positions, which is particularly helpful when objects or devices are moved during production, or when the cobot is transferred to another workstation.

Companies need easy-to-use, intelligent camera and image processing systems that will recognise patterns, carry out quality control, place objects and identify barcodes. For example, organisations in the food and drinks, pharmaceuticals and medical device sectors have to meet both high consumer expectations about safety as well as strict legal requirements. For instance, one pressing need is for vision systems that can check whether the information on a label or packaging is correct and complies with the consumer’s information requirements. When implementing cobots, it therefore makes sense to integrate image processing systems into the cobot to optimise traceability and logging protocols.

An integrated vision system can improve reliability, consistency and precision. Another advantage is its flexible scalability, based on the needs of the user. For example, it’s possible to start with a simple integrated system and then expand it as required. Smart systems based on Artificial Intelligence (AI) or Machine Learning (ML) can also help to enhance decision-making through the use of data visualisation.

Industry 4.0 and the Industrial Internet of Things (IIoT) enable historical data to be recorded and used for process improvements. However, many AI projects have problems with visualising new information. Fortunately, control solutions that are linked to predictive maintenance can merge the control functions of production lines and systems with AI processing in real time.

Today’s production facilities increasingly require in-depth knowledge combined with data that’s generated and collected at the machine level – ie at the edge. For example, a machine can learn from its human operators and improve its performance, as well as that of cobot applications. AI-driven technology can predict both product and device failures based on data from IIoT devices. The analysis of combined data enables the rapid prediction of machine errors, which in turn prevents plant downtime and product quality issues.

The AI controller can support companies by generating and evaluating data that can be time-stamped and easily visualised. Raw data acquisition is fully automated ‘at the edge’, leading to higher data accuracy and consistency. In addition, the controller automatically creates data models from the correlation analysis and uses these to monitor the machine’s status.

cobots can bring the flexible factory of the future to life by enabling machines and people to work side by side, and almost hand-in-hand. As part of a complete package that includes mobile robots, image processing technology, risk management and security services, cobots can bring considerable advantages to manufacturing and industrial companies. The latest cobots are safer, simpler to program and easier to integrate into other systems. They can therefore make a significant contribution to the development of an intelligent and future-oriented manufacturing environment.

In conclusion innovative cobots are very versatile and can be used in numerous applications, such as machine assembly, loading and unloading, assembly, adhesive application, testing and soldering. With an integrated and intelligent image processing system, users can benefit from further advantages that will improve production processes and relieve employees from repetitive tasks.

MORE INFORMATION: www.industrial.omron.eu

TOP TIPS FOR CHOOSING AN AUTOMATED VISION SYSTEM AS PART OF YOUR COBOT PROJECT

1. Start with Overall Equipment Effectiveness (OEE). Choose a provider that can help to calculate the OEE and can introduce improvements that will make processes more efficient.
2. Check the system’s compatibility. The image processing system should be able to integrate into the existing system and work processes, or to become an integral part of the cobot offering.
3. Ensure a seamless and hassle-free application. A well-designed, integrated solution should meet your application and runtime requirements. The system should include core functions such as image acquisition and processing (vision), software and network communication and the ability to control all of the devices in the machine network.
4. Select an experienced partner. Choose a provider that understands the branch and market regulations. If you opt for an unsuitable vision system, you’ll just spend more time and money making complex adjustments.
5. Choose the right system speed. It’s best to have a system that can process data based on the optimal speed of the production line. This should create added value with planned control and security projects and should have a positive impact on performance and profit.
6. Ensure good data integration. Ensure that your image processing system can be easily integrated into your production control system; and that your control system is well integrated into your business system for data storage and analysis. You need the different systems to interact seamlessly so that the result will be good traceability and reliable documentation.

BACK TO BUSINESS
CUTTING THE COSTS
WITH MANUFACTURERS FACING ONGOING PRESSURE TO CUT COSTS, IMPLEMENTING INNOVATIVE TECHNOLOGIES IS WIDELY SEEN AS A SOLUTION TO THE CHALLENGE

One in three (33%) of senior decision-makers at mid-market discrete manufacturers identified ‘rising costs of raw materials and components’ among their two main economic challenges over the next three years, while just under a quarter (22%) highlighted ‘rising costs of shipping goods’. That’s according to a recent independent study commissioned by advanced technology solutions and services provider, Delaware.

In light of this, it is unsurprising that 26% of the sample referenced ‘reducing operating costs’ among the top operational challenges they are facing in their supply chain, ahead of getting products or services to market faster (22%) and improving product quality (21%). Cost is a challenge even in streamlining manufacturing operations. 39% reference it among their top two, ahead of employee training (22%) and regulatory restrictions (21%). The need for enhanced management and control of costs is, of course, being brought into ever-sharper focus by the ongoing Covid-19 pandemic.

“Keeping costs down across their operations is an overriding concern for every manufacturer in these uncertain times,” said Richard Seel, managing director (UK and US) at Delaware. “In our survey, more than a quarter (28%) reference that ‘labour costs have risen’ as an impact of company-implemented or regulatory driven sustainability requirements on their supply chain. In addition, 38% of respondents identified that rising cost prices will be one of the biggest impacts of Brexit on the supply chain. Added to this, spending cuts and much tighter cost management will be an inevitable and pragmatic response to the virus outbreak as manufacturers look at ways in which they can improve the bottom line.

“Yet, the pandemic is set to have a far-reaching, long-term impact on the manufacturing sector, so manufacturers will also need to look at how digital transformation and the use of the latest advanced technologies can keep costs under control over the longer term.”

That’s why it is positive that cost reduction is widely regarded as a driver of innovation by the survey sample. Nearly half of the survey sample (47%) ranked it among their top two reasons for why they wanted to innovate or make changes to their organisation.

According to Seel: “Implementing innovative technologies is increasingly seen as a way to reduce costs by businesses today and that is going to be crucial in the pandemic recovery. Just under a third (31%) of our sample referenced that the perception is that these technologies will improve productivity, while 24% said the perception is that they will reduce costs.

“The potential of innovation to drive operational efficiencies is clearly there but it is important that manufacturers make the right technology choice as the economy continues the process of recovering from the virus,” he added. “ERP and EAM offer a positive route forward in this regard.”

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Cognex Corporation announces the launch of its DataMan 8700 Series of handheld barcode readers. Built on a completely redesigned platform, this next generation of handheld readers delivers cutting-edge performance and ease of use with no tuning or operator training required. Featuring advanced image formation and quick processing, the 8700 Series can instantly read challenging direct part mark (DPM) and label-based codes, even when vital elements of the code are missing or damaged. Designed with oil-resistant and waterproof plastics, the readers are built to last in the harshest manufacturing environments. Built-in OLED display screens to enable quick setup.

More information: www.cognex.com/dataman-8700

Sick is on the level with its CQF capacitive sensor

Compact, economic and quick to install, Sick’s CQF16 capacitive level sensor has been developed to provide a universal, non-contact solution wherever the fill level of water-based liquids must be detected in non-metallic vessels, tanks or pipes. The robust, ECOLAB-certified Sick CQF16 level sensor is supplied with a one-clip mounting bracket that can be fastened securely to the wall of any pipe or container. Using the capacitive measurement principle, it accurately detects water-based media regardless of foam, moisture or deposit build-up on the inside of the vessel. David Hannaby of Sick said: “The CQF offers an economical new alternative for a wide range of level sensing duties. Wherever there is a requirement for on/off or low/high switching, the CQF offers all the reliability and flexibility you need.

More information: www.sick.co.uk

Next generation handheld barcode readers

Cognex Corporation announces the launch of its DataMan 8700 Series of handheld barcode readers. Built on a completely redesigned platform, this next generation of handheld readers delivers cutting-edge performance and ease of use with no tuning or operator training required. Featuring advanced image formation and quick processing, the 8700 Series can instantly read challenging direct part mark (DPM) and label-based codes, even when vital elements of the code are missing or damaged. Designed with oil-resistant and waterproof plastics, the readers are built to last in the harshest manufacturing environments. Built-in OLED display screens to enable quick setup.

More information: www.cognex.com/dataman-8700

ToF sensors take production to new heights

Carlo Gavazzi has launched the latest LD30 Sensors with both ToF (time of flight) and IO-Link communication encompassed in the same sensor, offering an unrivalled flexibility to detect any object, any colour, any material or surface types at a distance of up to 1000mm. The sensor can be operated in IO-Link mode once connected to an IO-Link master or in standard I/O mode and offers adjustable parameters via the IO-Link interface such as sensing an adjustable sensing distance of 50 to 1,000 mm, either by potentiometer or via IO-Link where the analogue distance value between sensor and object is readable.

More information: www.carlogavazzi.co.uk
A report from Make UK revealed that 60% of its members have been subject to a cyber security incident, almost a third of whom suffered some financial loss or disruption to business as a result. 41% of manufacturers went on to report that they have been asked by customers to demonstrate or guarantee the robustness of their cyber security processes.

Industry 4.0 systems include various components, such as cyber-physical systems, cloud computing, edge computing and Artificial Intelligence (AI). But usually there is some physical component or sensor (usually many hundreds or thousands) which will be part of the system, often referred to generically as an IoT device. These components and sensors connect industrial systems to each other and are the interface to the outside world – continuously collecting data.

Although these components and sensors could be regarded as the strength of any given system it is entirely possible that it could conversely also be its Achilles heel. According to a report from Kaspersky Lab earlier this year, half of all industrial control system networks have faced some form of cyber-attack. Some connected devices lack the appropriate cyber robustness to prevent attacks and this, coupled with the fact that some control systems could be using outdated or bespoke operating systems or software, increases cyber attack vulnerability.

When we visit industrial sites, we are finding that there is sometimes a perception that because a system is complex that it is automatically secure. That is unfortunately not always the case. The introduction of the NIS Directive (security of network and information systems) in Europe is intended to improve this situation, but uptake is slow, as is the introduction of the standards required to assist in improving cyber security. However, standards do exist or are being developed by international organisations aimed at providing baseline protection, which would help to deliver basic security provisions for a first line in cyber defence. Examples include not having default passwords or ensuring that a device’s software can be updated “over the air”.

Two important standards that we see for IoT devices are NIST 8259 (US) and Draft EN 303 645 (EU). The scope of the NIST has been written with the intent to address a wide range of IoT type products, which have at least one transducer. So, it follows that it can apply to I4.0 industrial products. More importantly is that this standard has been mandated in California under State Bill No. 327, and it will likely pervade across the US. However, the scope of the Draft EN 303 645 standard is aimed only at consumer IoT devices, so is not applicable for industrial products, although the general principles therein can certainly be applied generically to afford some modicum of protection as part of a tailored risk assessment.

There is some debate that the present cyber security standards are lacking some detail and appropriate in application, and do not adequately cover the scope of typical industrial applications. That may be true, but they are at least a good first start where nothing previously existed that had a focussed scope.

There are several groups of published standards which are aimed at improving security from network infrastructure to devices. For example, it is possible that an industrial IoT device could be certified under the IEC 62443 series of standards, which aims to mitigate risk for industrial communication networks by providing a structured approach to cybersecurity. This would probably be more familiar to operators and integrators of control and automation systems. While this standard series has a mix of process and technical requirements, it covers what we would typically call a “product”. Therefore, in addition to this process requirements can be found in IEC 62443-4-1, and technical requirements in IEC 62443-4-2.

Although it may seem that the standards do not cover everything, and they don’t, they do at least offer that first line of defence. However, manufacturers should also consider their own cybersecurity programmes and there are other options outside the present standards’ landscape. This includes more stringent, bespoke testing or “pen testing”, which will identify deeper and more serious threats to a machine and the IoT system within which it sits. It is also vital to think “Secure by design” and take a proactive approach to cybersecurity recognising that attacks are “when not if”. What’s more, threat resilience is an iterative task. Not all threats may have been discovered on the first assessment, or may even exist yet. It’s therefore very important to ensure up to date compliance with all standards and constantly review your ‘cyber resistance’ status.

As Industry 4.0 and the IoT advance, systems and installations will become increasingly interconnected on a global scale. While digitisation and the increasing connectivity provided by the IoT bring enormous opportunities, unforeseeable risks and serious vulnerabilities can be exploited by new forms of cybercrime.

Ongoing investment in cyber security is crucial to keep up with technological development, as cybercriminals rapidly develop new forms of attack to hack into critical IT infrastructure. Sadly, at the present moment in time there needs to be more traction in device and component cyber assessment and it would be prudent for any integrator or end user to ask their supplier what level of cyber assessment has been performed and to prove its cyber attack resilience. MORE INFORMATION: www.tuv-sud.co.uk
Automation systems in the food manufacturing and processing sector depend on data from huge numbers of sensors. The most important parameters monitored by these sensors include pressure, temperature, flow and level. Many of the specifications for these sensors are the same as those in any other process industry but, in the food sector, hygienic design is often an additional and critical requirement. And in some cases, the sensors must also be suitable for use in hazardous areas.

Many sensor products are now available in hygienic versions designed specifically for food industry applications, and leading manufacturers of these sensors are increasingly focusing their development efforts on applying innovative technology to provide added value for users of their products.

A good example of these innovations is a new generation of level sensors that operate on the guided wave radar (GWR) principle. GWR sensors are installed vertically at the top of a tank and emit high frequency electromagnetic pulses that are guided downwards along a stainless-steel rod. These pulses are then reflected from the surface of the medium back towards the sensor. The transit time of the pulses is used to evaluate the distance to the surface and thus the level in the tank.

This measuring technology provides important benefits over other types of level sensors. GWR sensors are unaffected by changing media (provided that the dielectric constant >5), changing temperature, gas blankets or vapours, or by build-up of product on the probe itself. In addition, they can accurately and reliably measure liquid levels in many foaming applications. The probes for the food-industry versions of these innovative sensors are made of high-grade stainless steel and all other components follow hygienic design principles to meet the requirements of EHEDG. The best of these sensors also has an IO-Link interface.

Another example of sensors that offer added value is provided by temperature sensors that incorporate two sensor elements with opposing temperature characteristics. The elements – Pt1000 and NTC thermistor – operate independently and are continuously monitored by a microprocessor within the sensor. This verifies that the measured temperature value is valid based on a user defined temperature differential or ‘drift’ between the two sensors. If the internal drift is exceeded then it is signalled immediately via a separate diagnostic output. Both measured temperature values, the differential value as well as the diagnostic value, are available via IO-Link.

With the growing interest in and adoption of Industry 4.0, communication between devices and systems has never been more important. Communication at sensor level is the basis for comprehensive communication infrastructures that extend all the way up to corporate level and beyond.

For many users of industrial automation systems, sensor level communication means IO-Link and latest generation of sensors use this digital protocol as well as providing conventional analogue interfaces such 4-20mA. With IO-Link, interference on the connecting cable to the sensor has no effect on the accuracy of the measurement. Further, with IO-Link, multiple values from a single sensor can be transmitted simultaneously adding even more value to the user.

IO-Link also has benefits during maintenance and repair. Since sensors can be configured via IO-Link, should it become necessary to replace a sensor, the configuration data can be transferred directly to it. The time-consuming process of setting up the sensor on site is eliminated, which means that the time needed to put the plant back into service is significantly reduced. Users can even access self-diagnostic data from sensors that have an IO-Link interface, making the location of faulty devices faster and more certain. Once again, this helps to reduce plant downtime.

Another important aspect of the digital sensor communication is the transmission of sensor data to ERP and other high-level corporate systems. A convenient way of achieving this is to use an agent connectivity port, which is a software gateway that supports bidirectional communication for a wide range of different interfaces. This makes possible communication between ERP systems and other devices.
systems and devices at the field, control and process control levels. Implementations specifically designed for the capture and transmission of data from IO-Link sensors are available and, with these, data can be transmitted directly from sensors to the ERP system without the need for it to pass through a PLC. This direct path for sensor data which bypasses the control level is referred to as ‘Y communication’ because the data splits like the letter Y, flowing via one branch to the PLC and via the other branch to the ERP and other corporate systems. This solution opens up possibilities that would be hard to implement with conventional sensors and analogue interfaces. Data logging, condition-based maintenance and improvement of energy efficiency are just some of these.

MORE INFORMATION: www.ifm-electronic.co.uk

(Above) Many processes in the food industry require accurate control of the temperature of fluids

(Left) Type LR level sensors from ifm electronic operate to the guided wave radar principle which eliminates incorrect measurements due to foam and the build up of residues and deposits

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Practical sensor integration: Your questions answered

Charlie Walker, Smart Sensor specialist with SICK UK, outlines the tools needed for sensor integration and how they can be used to enable rapid process improvements.

There was a time when sensors were simple switches, and their manufacturers just hardware suppliers. All that has all changed. Realising the full potential of intelligent sensors in an interconnected and data-rich world, means integrating them with one another, and with wider machine, factory, logistics and enterprise networks.

For most of us, Industry 4.0 is all about a step-by-step growth in connectivity and data transparency at the machine or plant level. By building smart sensor applications, machine designers and users deliver Industry 4.0 capability one process at a time. Users are presented with new creative opportunities to rethink their applications in configurations that would have been inconceivable until relatively recently, while sensor manufacturers have become software developers and networking specialists.

Once you dip your toes in the developing world of Smart Sensor integration, you will see how quickly process improvements can be made. You will be rewarded with better machine availability, and more operational flexibility and responsiveness.

But what exactly is sensor integration, and, with a wealth of new language, terminology and concepts, where do you begin?

What is sensor integration? If sensors are the "eyes and ears" that tell us what's around them, then sensor integration is the process of embedding that knowledge into a system. Whether you are a car or a robot arm, you need sensor integration to fuse together the gathered data to make sense of the environment around you. Imagine trying to make a cup of tea without being able to see the kettle or feel when we have picked it up; integrated sight and pressure feedback together make the task possible. Sensors are not just switches; they are the building bricks of applications. In some cases, they can even process applications, or 'Smart Tasks', all by themselves.

How has IO-Link helped? IO-Link was certainly the breakthrough point-to-point open communications channel that 'bridged the final metre' between sensors or actuators and the control system. Enabled by IO-Link, sensors cooperate at the coalface of automation. They interpret, act upon and communicate the information they collect to an IO-Link Master so it can be transmitted via the factory ethernet network to a machine controller, such as a PLC.

Are there different levels of sensor integration? Some sensors just provide on/off signals – is the part present or not? Some use IO-link to give additional data to the control system. Soon there will be multi-use sensors which include multiple technologies, for example piston position coupled with vibration and angular velocity for end of arm tooling. Some connect to the cloud, ensuring accurate tracking of data to optimise operating efficiency and uptime.

So, is all this integration most useful for the enterprise level or the local level? Integration of hardware takes place at a local level within the systems and control architecture - but the data that this generates can be shared not just at the machine level, but via cloud-based systems. Firstly, that data can be monitored and trended on a PC, machine HMI or cloud-based dashboard.

It also has the potential to be used in ERP (Enterprise Resource Planning) and MES (Manufacturing Execution System) software; indeed this is seen as fundamental to the future of Industry 4.0 manufacturing and logistics. So, it's wise to be ready and build up inventories of smart devices that can deliver when the challenge is asked of them, as well as immediately giving you more real-time operating feedback and aiding your planned maintenance.

Data transparency enables trending and gives us the ability to understand so much more about a system. From Overall Equipment Effectiveness (OEE) to Deep Learning, it is the integration of the data that allows for a user to become more aware of what is happening within a system.

What practical steps can I take towards greater connectivity? SICK has been predicting for a long time that digitisation, intelligence and networking is going to increase until eventually manufacturing and logistics systems will control and optimise themselves – all using the data from our sensors.

You could be forgiven for thinking this all seems a bit too much of a "big picture" to be of practical value right now. You may even wonder how all this exchange of data doesn't just become one huge Tower of Babel, thwarted by different proprietary protocols and bogged down, as increased amounts of data are exchanged. The answer to this lies in integration gateways and devices, starting with the IO-link Masters that act as the translators, and also sometimes as localised controllers, to aggregate and route the data efficiently. They deal with the data at a local level, while making it visible globally.
Whenever a device does not use the same protocols as the cloud it wants to connect with, it will need a gateway to handle the transfer of data to the cloud. For example, an IO-Link sensor needs a master, and the master may need a cloud gateway of one sort or another. The gateway needs to be able to talk the right language to both the connected device and the higher-level cloud or network it is linked to.

SICK has already begun to roll out a portfolio of devices to facilitate sensor integration into fieldbus environments and higher automation hierarchies. But the terminology for these gateways and integration hubs can sound very similar.

What's the difference between IO-Link Masters, Sensor Hubs, Sensor Integration Machines, Sensor Integration Gateways and Telematic Data Collectors? An IO-Link Master sits on a higher-level bus system, such as PROFINET or EtherCAT. It acts as a gateway for IO-Link data to be passed on to the PLC or higher-level systems.

SICK's SIG200 Sensor Integration Gateway is an IO-Link Master with an on-board web server that collects, combines, evaluates and transmits signals from IO-Link Masters to the higher-level system or network it is linked to. The SIG200 can be used to bundle up to twelve standard IO-Links into one string that can be passed in one packet to the PLC. A maximum of 52 I/Os can be connected to one SIG200 by using the SIG100 sensor hub.

Sensor Integration Machines (SIMs) are hardware-based programmable devices that also have configurable onboard software such as SICK AppSpace, so they can be used to process many different tasks, including more complex machine vision applications, for example. They also include some or all of the functionality of an IO-Link Master.

The SICK SIM1000 and SIM2000 Sensor Integration Machines collect and evaluate data from multiple sensors and pass on sensor data. The SICK SIG200 can take sensor data and pass it on over REST API to the cloud or fieldbus to the machine controller. The SICK TDC can take data direct or via REST API and pass it to the cloud or a local network storage solution.

A sensor hub is an IO-Link device, such as the SICK SIG100 that connects to an IO-Link Master. It takes a number of on/off sensors that connect to it and it squeezes all their outputs into one string that can be passed up the chain to the PLC. SICK's SIG100 sensor hub can be used to bundle up to twelve standard IO-Links in a single IO-Link data packet, which can then be communicated to machine controllers and cloud-based systems via the SIG200. A maximum of 52 I/Os can be connected to one SIG200 by using the SICK SIG100.

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The SICK SIM1000 and SIM2000 Sensor Integration Machines collect and evaluate data from multiple sensors and pass on sensor data. The SICK SIG200 can take sensor data and pass it on over REST API to the cloud or fieldbus to the machine controller. The SICK TDC can take data direct or via REST API and pass it to the cloud or a local network storage solution.

When do you need other devices to link sensors in plant and machinery? Whenever a device does not use the same protocols as the cloud it wants to connect with, it will need a gateway to handle the transfer of data to the cloud. For example, an IO-Link sensor needs a master, and the master may need a cloud gateway of one sort or another. The gateway needs to be able to talk the right language to both the connected device and the higher-level cloud or network it is linked to.

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SICK's SIG200 Sensor Integration Gateway is an IO-Link Master with an on-board web server that collects, combines, evaluates and transmits signals from IO-Link devices from any manufacturer. SICK's innovative DualTalk technology means the SIG200 needs only one cable to communicate simultaneously via the fieldbus with the machine controller and with higher-level enterprise or web-based systems. It's the first of a family of intelligent Industry 4.0 gateways designed to work as both IO-Link Masters and small, distributed logical control systems in one.

Flow wrapping packaging machine application enabled by the SICK SIG100 and SIG200

The SICK SIG200 gateway and SIG100 Sensor Hub

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The SICK SIM1000 and SIM2000 Sensor Integration Machines collect and evaluate data from multiple sensors working together at the field-level via standard interfaces, including Ethernet, IO-Link, CAN and Serial. With up to four Ethernet ports, the SICK SIM1000 and SIM2000 can support interfaces for cameras, lighting, LiDAR scanners, encoders, photoelectric or displacement sensors, as well as to higher level controls and to the Cloud. The multi-sensor outputs, values and results can be used to drive typical industrial automation applications such as camera-based inspection, measurement, or identification of objects.

The term Gateway can mean different things depending on what is using the ‘gate’. In the case of sensor data, it may be the SICK Sensor Integration Gateways. More generally, a cloud gateway is a device that takes all sorts of data and passes it to the next level via the relevant protocol. Think of it as a translator. An example of this would be SICK’s TDC (Telematic Data Collector), used to aid real-time condition monitoring and predictive maintenance.

The SICK TDC collects and processes sensor outputs and data in stationary and mobile machinery, together with GPS localisation information, and enables them to be displayed, monitored, recorded and analysed via a server or cloud system. By transferring data via a mobile communications protocol (MQTT), a real-time overview of selected plant and processing parameters can be provided, and SMS text or email alarms can be configured.

The SICK TDC system also enhances system transparency to SICK and third-party sensors compatible with Ethernet, CAN, RS232, RS485, 1-Wire and UART interfaces. Output communications can be via cable, wireless signal or GSM.

Is there an easy way of detecting all IO-Link devices in a machine? Yes, this is simple using SICK’s FieldEcho software. SICK FieldEcho closes the remaining gaps in integration and makes all IO-Link devices visible, providing direct access to process and service data and enabling the IODD device descriptions to be automatically downloaded.

The FieldEcho has a well-designed user interface opened with a browser or integrated into the machine or plant HMI. It visualises all configured IO-Link Masters, IO-Link sensors and actuators, and displays their status.

These parameter values, diagnostic messages, events and alarms from the IO-Link devices are hardly ever needed by the control program of the machine, but they are invaluable for decision making both at the plant level, and in MES or cloud applications. Control communication via OPC UA or TCP/IP; as well as data exchange with IT- or cloud-based applications via REST, enables integration into any Industry 4.0 applications.

How does SICK envisage the future development of sensor integration? Industrial automation is developing rapidly. SICK’s intelligent sensors collect data, evaluate it in real time, adapt to their environment and communicate over the network. It is networked production and control processes, working in complex machine environments, that will shape our industrial future. The degree of digitalisation in future will mean smart factories will organise themselves using huge amounts of up to date information to make independent decisions. This information will be provided by smart sensors.

www.sick.co.uk
Safe operation is the top priority for Li-ion batteries. While conventional current fuses only offer protection against high current incidents, the Schott Sefuse D6SE-45 battery logic fuse provides additional protection against overcharging. These miniature surface mount battery logic fuses reliably cut off in case of overcurrent during discharge or overcharge. Excessive discharge currents will blow the fuse in a conventional manner. If there is an over-current condition during charging, then the D6S’s built-in heater is triggered, which then helps to blow the fuse circuit and protects the Li-ion battery.

Electrocraft introduces MPW series wheel drive for mobile robot applications
ElectroCraft has expanded its MobilePower product family with the MPW wheel drive. The MPW wheel drive features a high torque-density brushless DC motor with a heavy duty integrated planetary gearbox mounted inside the hub of a lightweight aluminum wheel with custom tread. Designed for mobile robot applications, the MPW combines optimum performance with high-efficiency, quiet operation and long life. ElectroCraft says its MobilePower MPW series wheel drives feature an integrated design that provides increased performance and reliability when compared to traditional motor/gearbox/wheel combinations.

Reliable secondary protection for battery packs from ATC Semitec
Safe operation is the top priority for Li-ion batteries. While conventional current fuses only offer protection against high current incidents, the Schott Sefuse D6SE-45 battery logic fuse provides additional protection against overcharging. These miniature surface mount battery logic fuses reliably cut off in case of overcurrent during discharge or overcharge. Excessive discharge currents will blow the fuse in a conventional manner. If there is an over-current condition during charging, then the D6S’s built-in heater is triggered, which then helps to blow the fuse circuit and protects the Li-ion battery.

Torque motors feature variable assembly options for optimisation
Baumüller offers its DSt2 motors with different installation options. The classic option for these direct drives is the version with hollow shaft, which offers high rigidity and thus good power transmission. The connection to the machine can be made using a clamping set, a shrink disc, a hydraulic clamping bush or a ball screw. The second option is the kit motor, where machine builders have extra flexibility in integration. In this case, the customer is only provided with the active parts of the motor which allows optimal integration into the machine. Finally there is an industry-specific solution in the version with thrust bearing.

MORE INFORMATION:
- www.electrocraft.com
- www.baumueller.de
- www.atcsemitec.co.uk
Technical revolution
In automatic turning

IGUS HAS DEVELOPED AN ENERGY SUPPLY SOLUTION FOR ROTATIONAL AND LINEAR MOTION FOR DMG MORI

After only two years of development time, DMG Mori ushered in a new era of automatic turning machines with multiple spindles. The current MULTISPRINT series represents a technological revolution in automatic turning. The efficient turning machine itself and the fast, precise and diverse production processes that are enabled, make the MULTISPRINT into a machine with almost unlimited possibilities. Outstanding performance and quality developed and manufactured in Italy, with support and professional back-up from Germany. Igus offers a special energy supply solution for both rotational and linear motion.

The ‘readychain’ harnessed energy supply system from Igus and the spindle drum were first brought together in April 2017, when many processes and manual procedures were not yet routine and demanded maximum attention from the people involved. On the MULTISPRINT, the readychain includes eight energy chains, 64 electric cables and 73 hoses. The construction has a 1.8m high body for rotation. The six linear energy chains for driving the spindles protrude from this body like arms. In the chains, there are chainflex cables that are designed for motion and are fitted with appropriate industrial connectors. These are connected to the electromechanical components on the turning machine.

The engineers and technicians continued working for a further three months until midsummer 2017 to assemble the machine completely, test it and send it on its travels: the destination was the world’s largest machine-tool trade fair, EMO in Hannover. Here, the MULTISPRINT was presented as a revolution in mechanical engineering – the first machine to combine a multi-spindle automatic lathe with SWISSTYPE technology. And all this with a Y-axis on each spindle position.

Maximum flexibility due to new technology
Due to globalisation and market dynamics, customer requirements for modern turning machines have change. They now demand shortened processing and tooling times, reduced effort for process development and integration and, at the same time, an ability to handle the increasing degree of complexity. The MULTISPRINT meets all these challenging requirements. Nozzles for fluid power equipment, implants for dentistry and shafts for motor vehicle manufacturing are just three examples of complex components that can be made on these high-tech machines. The result is a manufacturing solution for scalable requirements from initial series production to the high-volume production of complex workpieces. The customer enjoys maximum flexibility for the mass production of components with a diameter of up to 50mm.

The heart of the machine is the spindle drum with six spindles for simultaneous machining of several workpieces. The main spindles in the drum have a travel of up to 1800mm. The drum moves the workpieces to the tools quickly and very precisely. It only takes 0.65 seconds for one of the six spindles to travel to the next position. For spindles to return to the starting position after machining has been completed in the six stations, the drum must turn 300 degrees in reverse. For this, the unit, which weighs over three metric tons, only needs one second. The rods are pushed out of the loader through the drum to get into position for machining.

Reliable energy supply concept
In summer of 2016, DMG Mori invited tenders for the catalogue of requirements of the MULTISPRINT. Mirko Passerini, technical director at DMG Mori, said: “Progress and plans were compared and harmonised several times a year. Ideas for solutions were developed and sometimes rejected.” With plans for the sheet-metal design made and suitable cables and hoses for supplying the drum with energy, data and fluid were chosen. “The readychain solution from Igus was the breakthrough for us,” said Passerini.

The energy supply system rotates with the drum and enables the linear movements of the spindle drums. Consisting of a metal frame, cables, hoses and chains, the system is located in the middle of the machine and is suspended from the drum, which rotates permanently at high speed. “The statics of the metal construction were a new challenge,” says Volker Beitel of Igus. “After every stage of development, we re-calculated the statics in order to be sure that the metal construction would remain stable and not become fatigued.”

Igus uses a rotary energy supply system that rotates along with the drum. These are custom-made systems for circular movements with energy chains, which are used in machine tools and construction machines. The standard rotary modules consist of two circular guide elements. One part of the guide trough is attached to the stationary part of the system and the other part to the rotating part. The reverse bend radius enables movement of the energy chains in two directions. Rotation angle up to 540 degrees on one plane can be made possible here.

Solving the problem with plastic
The drum in the MULTISPRINT rotates in a range of 300 degrees and consists of two rotation systems. In the outer system there are the hoses, as they need a somewhat larger bend radius, which is 160mm in this case. In the inner circle, twenty-four cables are guided – 12 encoder cables and 12 servo cables. For each of the six linear chains, there are therefore two encoder cables and two servo cables. One of the servo cables supplies the energy for the linear movements of the main spindles in the drum and one drives the spindle motor. They can move at a speed of 0.66m/s and with a maximum acceleration of 10m/s².

The six energy chain systems can be plugged in individually due to distribution boards and are easy to maintain or modify. This was also one of the main requirements of DMG Mori. In addition, the chains and cables of the readychain must manage with a relatively small installation space. It is important to ensure that the working space for the mechanics behind the drum is as large as possible. The system developed by Igus completely meets these requirements.

Engineers from Igus had three months to develop the system. During development, a lot of value was placed on the modularity of the individual components. The linear chain systems can be plugged in and the sheet-metal parts designed by igus, for attachment to the machine, are made of several parts. This facilitates handling of the readychain on the customer’s premises. The goal of Igus is to ensure that the energy supply system has a service life of at least five years.

MORE INFORMATION: www.igus.co.uk/readychain
With over 50 years of experience, Vola is one of Denmark’s leading manufacturers of high-quality sanitary fittings, with product lines such as bathroom mixers and kitchen taps. Due to increasing market demand for a wide range of product variants, Vola decided to expand its plant by 5,500 square meters. This area includes a new high-bay warehouse, an assembly hall and facilities for the delivery of goods.

In one of the most ambitious projects involving industrial mobile robots in Northern Europe, Vola commissioned a fleet of nine Omron LD robots. These have replaced roller conveyors, leading to a more flexible production and logistics set-up that matches the company’s single-piece production process, in which everything is produced to order.

Peder Nygaard, factory director at Vola, explains: “Roller conveyors are really efficient, but I don’t know what our production set-up will look like in ten years. If we installed more conveyors in the production line, we could quickly compromise the flexibility on which we pride ourselves. That’s why we’ve chosen the autonomous robots from Omron, as these are much more flexible.”

The robots have been tasked with transporting components and finished items back and forth between the high-bay warehouse and assembly hall. The robots are controlled by the Omron Enterprise Manager – a fleet management system which, like a control tower at an airport, ensures a smooth flow of traffic. The system tells each individual robot where and when to move, including when it’s time to take a break to charge its batteries.

“There are only a few robot manufacturers that are able to handle the advanced fleet management of so many robots. The solution by Omron is by far the best that we’ve seen in the market, and this is why we opted for the LD mobile robots,” says Nygaard. To take full advantage of its investment, Vola designed the new factory so that it is ideal for collaboration between people and robots. For example, the locations of the mounting tables and walkways are designed for safety, convenience and the free movement of both people and robots.

The workflow has also been designed to ensure the perfect alignment of tasks for the workers and the robots. Previously, the assembly staff would call up a job list on their screen, but this is now managed by the central team. The job list will appear on the employee’s screen once they have scanned the item that the robot is transporting.

“We are implementing something that hasn’t been seen before,” says Nygaard. “That is why we also recognise that there will be an adjustment period when we have to ensure that our employees become used to collaborating with the robots.”

According to Omron’s area sales manager, Thomas Jansen, the project has taught him a lot: “Implementing mobile robots may be seen simply as a question of plug-and-play. However, we need to make sure that aspects such as the production layout, logistics and organisation are taken into account in the planning phase.” The nine mobile robots at Vola are scheduled to be supplemented by eight more robots in the project’s next phase.

More information: www.industrial.omron.eu
CONTROL TECHNIQUES HAS BEEN CHOSEN TO PROVIDE A NEW DC SYSTEM FOR A HISTORIC CLIFF RAILWAY PROJECT IN ABERYSTWYTH

Motor Control Warehouse, on behalf of Aberystwyth Cliff Railway, had a challenge to solve. The company realised the railway’s control system was becoming harder to maintain due to components being made obsolete. For a solution it turned to Control Techniques.

Constitution Hill, Aberystwyth, rises dramatically from the sea, providing spectacular and uninterrupted views of the town, Cardigan Bay, and on a clear day 26 mountain peaks spanning the length of Wales. A popular and relaxing way to enjoy this majestic panorama is to travel by train on the longest funicular electric cliff railway in Britain, which has been transporting visitors to the summit since 1896.

The original control panel was built in the 1980s and utilised Control Techniques’ first-generation Mentor DC drive – the world’s first variable speed drive to use a microprocessor in its control system.

Control Techniques’ Mentor MP was central to the winning solution. Readily available, Mentor MP eradicates the previously experienced maintenance issues. Controlled stopping was implemented using a four-quadrant drive, and additional fail-safes to stop the motor under an emergency stop condition, including limit switches to improve safety in case of failure. The solution was further enhanced by moving the safety circuit to a dual-channel, bringing the system up to date – now meeting SIL3 Category 1. The new super modern control system has improved the operability of the 124-year-old railway system for both tourists and staff. The replacement system was fully implemented before the railway’s annual seasonal opening. Amazingly, the original Mentor drive was still operational at the point when the old system was decommissioned, having completed approximately 200,000 round trips in its lifespan.

Gez Evans, manufacturing director of The Motor Control Warehouse, said: “Due to the advancement in technology, the railway sought to improve the safety of the system. From our investigatory work, we found the original safety circuit to consist of single-channel limit switches, emergency stops, and over speed detection devices – all wired in series with a basic latching circuit, on a single e-stop contactor.

“A single fault on any of the limit switches, e-stops, overspeed detection device, or e-stop contactor could cause a catastrophic failure. Therefore, our main design objectives were to build a system comprised of readily available components, with several fail-safes in place to prevent a single component failure potentially causing a dangerous situation.”

MORE INFORMATION: www.controltechniques.com
LEADING THE LIGHT REVOLUTION

EMS HAS SUPPORTED THE NEXT GENERATION OF LIGHTING SYSTEM AND CAMERA PLATFORM INNOVATION

Czech photographer Miroslav Tichy once said that photography is simply painting with light. Light Revolution, a lighting and camera system manufacturer for the film, photography and photogrammetry industry, with the support of mechatronic drive motor specialist Electro Mechanical Systems (EMS), has taken the concept of painting with light straight into the 21st century.

Developed by founder Patrick Llewelyn-Davies, Light Revolution provides creative lighting systems for the film, photography and photogrammetry industry that use long exposure techniques to manipulate lighting in product imagery. The Light Revolution base system comprises of fifteen main components and takes just minutes to assemble, meaning that innovative and eye-catching images can be captured in moments.

“We’ve taken the concept of painting with light and brought it straight into the modern era,” said Llewelyn-Davies. “The central hub of the base system rotates the arms and delivers power to the lights. The system also comprises of two arms with pylons to attach the lights and adjustable legs, which support the hub. There is a separate support assembly complete with a 1000mm diameter circular tabletop for the object in question to be placed; ready for capturing.

“We have developed a precision engineered system that uses high quality components to ensure a smooth and seamless experience for the user — and one that captures the most wonderful images possible,” added Llewelyn-Davies.

While researching options, Llewelyn-Davies recognised the need for high quality motors, which would enable the rotating turntable to move smoothly and effortlessly. “It was vital that the motors we used were reliable, accurate, easy to control and offered precise timing. The motors are used to turn the rotating arms in the system, which go through an internal gear in the main hub of the unit. Because of the level of quality and control we wanted to provide in our system, and in order to capture the detail of each image taken, we knew we needed a high specification motor.”

While researching options, Llewelyn-Davies completed test simulations with various motor and gear box combinations but didn’t find the fine control that was needed to match the quality system he had developed. Further research led to Faulhaber motors, which are already extensively used in other photographic systems. As a result, Llewelyn-Davies contacted EMS, the sole supplier of Faulhaber motors in the UK.

Dave Walsha, commercial development officer at EMS worked closely with Llewelyn-Davies to source and deliver the best option for the Light Revolution system. “When considering the options for Light Revolution, I immediately identified that the Faulhaber brushless motors would be the ideal solution,” Walsha explained. “The controllability and overall longevity of the Faulhaber brushless motors give a level of performance that was perfect for this application.

“The biggest challenge for the system was the need for the central hub to spin smoothly, with extremely high levels of precision, while also maintaining the portability and light weight of the equipment as a whole. The Faulhaber brushless motors provide a high power, precision and are also a light-weight option, making them perfect for this use. The range of Faulhaber motors I initially suggested – the BX4 family – can control speed while providing extremely accurate levels of movement.

“By opting for a family of motors, it also meant that we were able to test the power of the motor without compromising the programming work that had already been put into developing the system,” added Walsha. “The Faulhaber BX4 motors come in a range of sizes and power capabilities. This meant that if the first motor we suggested wasn’t powerful enough, or if Light Revolution wanted to create larger or more intricate system designs we would have been able to scale up the power of the motor without the need for a change to the core programming of the equipment.”

Llewelyn-Davies said: “When you’re trying to introduce new technology into a well-established industry, like the photography and cinematography sector, you need to ensure that the equipment provided is up to scratch from the outset. The Faulhaber BX4 motors that EMS supplied have given us the accuracy and reliability we were looking for from a motor, all while being powerful enough to turn the system with ease.

“As the motors are used across critical industries such as aerospace and nuclear power, I knew they would supply the level of precision and reliability needed for our system.

“The support that EMS provided was second to none. Being a small developer, having a direct point of contact with a member of the team that was able to suggest exactly the right motor for our system was invaluable.”

The Light Revolution system is now being tested by companies that specialise in 360-degree photography and beyond. A number of renowned museums across the UK are interested in using the system to photograph artefacts and items from their collections, while universities across the country are also enquiring about the possibilities.

“There is a huge amount of potential for the system, both across the UK and globally,” Llewelyn-Davies said. “With its portable nature, it is possible to transport the system from one site to another relatively easily, meaning that there’s no need to rent expensive equipment on location or on film sets. Our system gives image capturing experts the ability to paint with light at the touch of a button.

“The support from EMS provided has been critical for the success in developing the system, which is vital for the rapidly growing and innovative industry that we are working in. We see a lot of opportunities coming up that mean we’ll continue to use Faulhaber motors from EMS for the foreseeable future.”

MORE INFORMATION: www.ems-limited.co.uk
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FIT AND FORGET

HEPCOMOTION’S ‘FIT AND FORGET’ ACTUATORS PROVIDE A LOW MAINTENANCE SOLUTION IN A HIGH DUTY BREAD MANUFACTURING APPLICATION

Bread remains one of the UK’s favourite foods bought by 99% of households. Not surprisingly, the UK bakery market is one of the largest in the food industry, and there is a high need for modern technology to rise up to market demands. To keep up, the food processing industry needs to be efficient; this means most of the tasks need to be automated. But in every automated system, there are a host of smaller components that perform simple yet essential processes. Without these, the automation could not take place.

Based in Newport, South Wales, David Wood Foods manufactures bread for the biggest retailers in the UK. Operating a fully automated production line, from the initial weighing and mixing of ingredients, to the proofing, baking and cooling, right through to the slicing and packaging, David Wood Foods currently produces in excess of 420,000 loaves a week. Operating 24/7, 364 days of the year (Christmas day being the only non-operating day), this is a high duty system requiring a low maintenance, reliable solution. In addition to this bread manufacturing site, there are a further seven David Wood sites throughout the UK manufacturing luxury meals, savoury pastries, pasties and crafted bread. In a mature and fiercely competitive market, David Wood Foods operates highly efficient manufacturing sites to stay a step ahead of the competition.

Actuators are often essential elements of a production line in the food industry and for David Wood Foods this is no exception. In this high duty application, David Wood Foods use HepcoMotion’s DLS4 belt driven actuator system which comprises belt-driven linear modules, an AC motor/inverter package and a range of compact planetary gearboxes for use with servomotors. Corrosion resistant options are also available, very often a key requirement in the food and packaging industry where regular wash/wipe downs are frequently required. HepcoMotion specialises in high quality linear solutions and automation components and, celebrating its fifty-year anniversary this year, has gained a reputation for its high-end, low maintenance products.

A total of ten DLS4s are used in three key areas of the production line. Two are used to push the loaves into the oven, four are used as an infeed and outfeed in the cooler, and the final four are used in the packaging area to assist with packing the loaves into the delivery baskets. Ideally suited to this application, DLS4 is a reliable, low maintenance solution offering trouble-free operation from proven V guide technology and a long system life.

Arranged in parallel and operating with a single motor, the first set of DLS4s are connected to a pusher arm which moves the trays of loaves forward onto a conveyor, into the oven operating at a temperature of over 200°C. Working in close proximity to the oven, the double row bearings are suited to the high temperatures. HepcoMotion also offers vacuum and extreme temperature bearings for either extreme high temperatures or extreme low temperature applications. 32 loaves are moved at a time and baked in the oven for over 20 minutes. The actuators are constantly repeating this process every 30 seconds, 24 hours a day, seven days a week. As a zero backlash system, the DLS4s are able to offer the greater repeatability and accuracy required for this application.

Bespoke lengths up to 8m

Another advantage with Hepco’s DLS4s is that they can be specified to a bespoke length to the nearest mm, up to 8m as standard. This offers customers greater flexibility as they can specify the stroke length to suit the production line, rather than having to design around a standard stroke length. This was an advantage for David Wood Foods as they could easily have variable stroke lengths to suit the different processes the DLS4s are used for. Hepco’s DLS modules can also be supplied as joined sets to fulfill longer stroke requirements.

After the loaves have baked in the oven, they are transported to the cooler where they spend two hours rotating on a cooling rack. Cooling is a key part of the bread manufacturing process to prevent the bottom crust becoming moist and soggy. David Wood Foods has approximately 9kg of loaves in the cooler at one time. Working in parallel with a single motor and attached to a pusher arm, one set of DLS4s push 22 loaves onto the rack, while the other set of actuators push the loaves from the rack onto the conveyor to get transported to slicing and packaging.

As with all food industry applications, the resulting breadcrumbs and dust at David Wood Foods creates a hostile, challenging environment. If particles of dirt and debris find their way beyond the seals of any linear motion component, or if they become damaged, the system will become jammed and motion will be impeded. This can result in catastrophic failure – meaning excessive downtime, and a complete system change. DLS4, however, is ideally suited to this harsh environment thanks to its V guide system that functions on the basis of tight geometrical control over matching slide and bearing Vs. In turn this provides a wiping action that expels debris, keeping machines running and reliable. This self-cleaning action eliminates contamination of the slide – a key benefit for David Wood Foods working with extensive breadcrumbs.

As small, but central parts of an enormous production system, low maintenance is a core requirement of these actuators. If one part of the system goes down, the entire production line is affected. With a high throughput of 420k loaves a week, any unplanned maintenance is going to have a big impact.

A big advantage of Hepco’s V guide systems is that they have long re-lubrication intervals. Saving valuable downtime and cost, Hepco’s cap seals need re-lubricating every 1000km, compared to every 100-150km with ball rails. These long re-lubrication intervals work well for David Wood Foods, dovetailing with the companies monthly planned maintenance schedule. In the last 12 months, re-lubrication is the only maintenance that David Wood Foods has had to carry out on the DLS4. Low maintenance cap seals are used to constantly lubricate the system and to provide effective sealing and protection.

David Wood Foods requires minimal downtime and servicing to achieve continuous operation. When a DLS4 shows sign of wear, the process is simple and does not impinge too much on production time. The eccentric adjustment facility of the V bearings can be used to quickly and simply remove any play that has occurred. Moreover, when the V bearings reach the end of their lifetime, they can be replaced individually, and not as an entire set, saving both time and money. The DLS4s have been in operation for nearly 10 years and the bearings have never been changed.

With winter approaching and the onset of chilly winter nights not too far in the distant, the move towards comforting soups and heart-warming stews will see an increase in demand for scrumptious bread. Hepco’s DLS4s will continue to provide a reliable, ‘fit and forget’ solution ideally suited to this hostile and high duty application.

MORE INFORMATION: www.hepcomotion.com
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Robots are gaining ground. In all important industrial sectors, the cooperation between humans and robots is becoming increasingly closer. This increases the risk potential. If, for example, a power failure occurs during a working process, the robot arm undertaking the working step must be held immediately and accurately. Therefore, it is important to permanently exclude the risk of an inadvertent descent of the load as well as unpermittedly long stopping distances already in the design phase.

Decisive for this purpose are the correct selection of safety brakes as well as their proper integration into the overall system. Safety brakes according to the fail-safe principle are the first choice for servomotors, as these brakes are closed in de-energised condition. They provide the required braking torque even in the event of an emergency stop, a power failure or in case of an interruption in the power supply caused by cable breakage, for example. To ensure that the safety brakes also provide sufficient friction work in emergency stop situations and brake movements with a defined braking torque, a friction lining developed for this purpose with a corresponding steel counter friction surface is required.

There are safety brakes for servomotors which are especially adapted to the high requirements of robotics. Users can choose between classic servo brakes in the motor, with hub and toothed rotor or so-called pad solutions with large inner diameter. The latter are specially designed for integration into the robot joint. But even the classic brakes can be adapted to customer specifications and integrated directly into a joint. In the motor, servo brakes are preferably installed into the A-bearing shield, because the fixed bearing is located here and temperature expansions cannot influence the brake severely.

However, brakes from renowned manufacturers can also be integrated into the B-bearing side of the motor without restriction, as here temperature expansions and bearing backlash do not influence the function and reliability of the brakes negatively. Alternatively, users can also make use of mounted brakes, which are attached to the motor in a modular fashion. High-quality servo brakes are also characterized by compact dimensions. Not only are they very lightweight, but also extremely fast when it comes to magnetic actuation. At the same time they display high performance density and wear resistance.

Furthermore, the brakes impress users with their high permitted friction work during dynamic braking actions: For servo drives, normally load mass ratios (load/motor) of 3:1 or smaller are selected for the benefit of good control characteristics and high dynamics. On the brakes of renowned manufacturers, high permitted friction work and friction powers mean that load mass ratios of 30:1 and more are possible.

Short switching times
Short stopping distances are important for the safety of people and machines. The brake switching times are decisive for the braking distance, because during the free-fall time until the brake closes and the retardation takes effect, the mass additionally accelerates – possibly to such extremes that the permitted values of the brake are exceeded. Users should therefore pay attention to verified switching times which are as short as possible when selecting safety brakes – and also assure themselves that these switching times can be maintained throughout the entire lifetime of the brake.

Here, monitoring solutions are important. Previously it was not possible to monitor servo brakes due to the small air gaps. This is a concern in view of the increasing networking of machines. Of course, the control and regulation electronics of the servo system provide data that also allow conclusions to be drawn regarding the state of the overall system. But the safety brake itself remains silent. Even though in closed systems data from the brake would also be very helpful and would enable, for example, predictive maintenance. If, for instance, the friction lining reaches the end of its service lifetime, intelligent monitoring could provide timely warning. The maintenance date could then be scheduled long-term for a time window that is favourable in terms of the overall operating process. Monitoring is therefore also very useful for these safety brakes integrated in servo drives.

Mayr Power Transmission offers exactly these possibilities with its intelligent Roba-brake-checker module. It works without sensors. Instead, it detects the movement of the armature disk by analysing current and voltage, and knows what condition the brake is in. From the control cabinet. In addition to the switching condition, temperature and wear, it monitors the tension path or tensile force reserve, ie whether the magnet is still able to attract the armature disk.

On reaching the tensile force reserve, the Roba-brake-checker emits a warning signal early enough so that a certain operating time for the brake is still possible. During this time, maintenance is possible in a targeted manner, aligned to the working process. This in turn ensures higher system availability. In a further expansion stage, the module can also be integrated into a remote maintenance system via a suitable interface. This further reduces service times and costs.

If damage should occur nevertheless, the Roba-brake-checker provides users with significantly better analysis options. With previous solutions, such as contactless release monitoring, users are only able to see the failure and the destruction pattern. They do not know, however, why the error occurred. However, using the Roba-brake-checker, progressions are made visible and error analysis can be used and even transferred onto other user systems. All this data from malfunctions and normal operation thus supply valuable input for future optimisation.

To guarantee that the brakes always ensure the highest level of safety in the respective application, it is important that the static and dynamic braking torques correspond to the respective customer specifications. For this purpose, it is necessary to check these two application conditions in trials. Therefore, it is highly recommended that users obtain information about the manufacturer’s test field, and question whether the brakes are subjected to tests that are as realistic as possible.

In addition to quality assurance measures during the construction process, a manufacturer should also carry out a comprehensive final inspection. This means that every single safety brake which leaves the plant is subjected to a 100% inspection following assembly and adjustment. At Mayr, all the determined measurement values are archived together with the corresponding serial numbers of the brake in an electronic database. Only in this way 100% traceability can be ensured.

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BESPOKE BATTERY STRATEGY

THERE ARE A NUMBER OF FACTORS THAT BUSINESSES SHOULD TAKE INTO ACCOUNT TO IDENTIFY WHICH LITHIUM-ION SETUP IS THE MOST APPROPRIATE FOR THEIR APPLICATION, AS JON DIVERS, CUSTOMER SERVICE DIRECTOR AT JUNGHEINRICH, EXPLAINS.

The speed with which organisations are embracing Lithium-ion battery technology is gaining pace. Spurred on by environmental concerns, cost assessment and efficiency drives, many businesses are becoming increasingly knowledgeable about Lithium-ion, especially in terms of its varied benefits.

But while organisations may be aware of the appeal of Lithium-ion in terms of its ability to support 24/7 logistics operations with fast charging and no battery changes, they may not be aware it’s not a one-size-fits-all approach. In fact, there are a number of considerations that should be taken into account to identify which lithium-ion setup is the most appropriate for each business in order to unlock the highest reward from the technology. The wrong battery and charger combination will not recognise the advantages of a correct match to the application of individual customers.

Not all battery environments are the same; a warehouse or logistics environment is unique compared to other battery powered vehicle environments. For electric cars, for example, the technology is all about the distance achieved between charges and the weight of the battery pack. Achieving the best balance here achieves the greatest gains for the driver. Electric automotive manufactures are constantly striving for higher density and lower weight batteries with the best range and shortest charge times.

However, the same constraints are not present in a warehouse for materials handling equipment as the charger is almost always available close by and charging can be done regularly whilst the truck is stationary for a short period of time. And weight is a friend rather than a foe when it comes to a forklift or counterbalance truck for example, so different battery chemistries can be considered, such as the use of Iron Phosphate. Different manufacturers will use different chemistries, but Iron Phosphate is currently the safest cell chemistry and from an ecological point of view, it’s also non-toxic and harmless.

It’s not as simple as finding the biggest battery you can. And it’s more than just fast charging. It’s a bespoke solution for each business, depending on its needs and setup.

Water, tap and bath

A simple way of explaining this is through a ‘water, tap and bath’ analogy. How long does it take for a tap to fill up the bath? It depends on how big the tap is, how fast the flow of water and how big the bath is. An efficient setup for one environment could be to have the biggest tap with the smallest bath; ie the biggest charger with the smallest battery. With a smaller tap (or smaller charger) and a big bath (big battery), it is going to take longer to fill, however this could be the optimum solution to work within the power requirements (or water pressure). Every application is and should be different for each business to gain the most value.

To deploy the most appropriate Lithium-ion strategy, the most important questions are: How long will the truck be working? And when are the breaks in any given shift? This determines how often the forklift will be put back on charge, which in turn dictates what size of charger and battery is best suited. This is then matched against the available power into the building.

Data analysis

But some businesses might think that they don’t have enough breaks, that their trucks are working non-stop. This is where a data recording device comes into play. Trucks will either be working (the wheels are turning or the mast is moving – the truck is in use), standing (the truck is not moving, albeit turned on or off), or charging. The data recording device can capture that data every 20 seconds over five days, providing over 22,000 readings to identify where the potential breaks are and the typical energy consumed during a given period of time.

For example, a shift change might actually take 20 minutes from start to finish. But in that time, you can already have put nearly 50% energy back into the battery. Capitalising on breaks such as these can go a long way to supporting the increasingly common 24/7 operations of an organisation.

In conclusion, each different battery chemistry setup offers different characteristics to serve a variety of charging strategies – but it is key for each organisation to capitalise on the bespoke nature of Lithium-ion in order to realise the most efficiencies out of the technology.

By working with a consultant that is an expert in the field, the right Lithium-ion strategy can be identified and implemented rapidly. That way not only will each business achieve the highest reward, but they will be safe in the knowledge that it will also be in the most efficient way possible – not just a one size fits all solution.
Out and about among the bread and gingerbread

JOWA’S REGIONAL BAKERY AT GOSSAU, ST GALLEN, RELIES ON ELECTRICALLY-POWERED FORKLIFT TRUCKS FOR THE INTERNAL TRANSPORT OF GOODS. A CUSTOMISED CHARGING STATION, PROVIDED BY FRONIUS, HAS RECENTLY BEEN INSTALLED AS A POWER SUPPLY FOR THE FORKLIFT TRUCKS. ADVANCED TECHNOLOGIES AND INTELLIGENT FEATURES MAKE IT EASIER TO CHANGE THE HEAVY TRACTION BATTERIES, REDUCE ENERGY CONSUMPTION AND ENSURE THAT THE FLEET IS ALWAYS AVAILABLE.

From crispy cobs to delicate braid to Weggli, the epitome of the classic breakfast roll, Jowa products probably mean something to everyone in Switzerland. The company, based in Volketswil in the Canton of Zürich, is the country’s leading bakery and part of M-Industry, supplying bread, cakes, pastries and pasta products to all Migros stores, as well as many other businesses and catering facilities.

Gottlieb Duttweiler, the Swiss visionary and man behind Migros, founded the present-day Jowa in 1931, as one of many industrial enterprises producing goods directly for the distributor. Production is mostly centred in Jowa’s eleven regional bakeries. One of them is located in Gossau, a suburb of St. Gallen. The logistics of the site are impressive: it is not just a matter of making all the items, they also have to be packaged, temporarily stored, picked for orders and sent to numerous outlets throughout the country.

In the order picking halls, a fleet of nine electrically-powered forklift trucks ensures the fast and emission-free transport of goods. As Jowa works six days a week, 24 hours a day, the forklift trucks are equipped with back-up batteries, so that they are ready for use at all times.

“Constant availability is particularly important for our Christmas trade, because this time of year sees an increase in utilisation of around 20% compared to other periods,” reports Daniel Lendi, supply manager at Jowa in Gossau. “All the manufacturing and logistics processes must therefore engage seamlessly with one another.”

Until recently, Jowa relied on chargers using 50Hz transformer technology as the power supply for their lead-acid batteries. But this did have some disadvantages, remembers Lendi: “The huge devices simply rested on the hall floor and took up a great deal of valuable space. With traction batteries weighing almost 400 kilos, changing them also took a vast amount of effort and always involved two members of staff. Yet the safety risk remained considerable, as the batteries could easily topple over and injure employees.”

The technology also showed clear weaknesses in terms of energy efficiency. The outdated charging process caused overheating, in turn leading to high energy consumption and harmful warping of the battery. The devices did not have any charging status indication either, so batteries were often changed unnecessarily. “The forklift trucks and batteries were specifically matched, and the battery was often changed simply at the end of a shift, regardless of how full or empty the battery being used actually was,” explains Lendi. Not only did this take time, it also had a negative impact on the service life of the expensive batteries.

A close eye was kept on the charging technology of the forklift fleet, and the decision was made to replace devices that were showing their age with a modern and more economical solution. Fronius was the first port of call for the project.

Fronius specialises in providing an efficient and sustainable energy supply for electric forklift trucks. “Intensive and individual advice is vital if we are to provide the best solution for every user,” explains sales expert Reto Baumgartner, who managed the project for Fronius. Together with Jowa, he designed a system that was perfectly tailored to the food manufacturer’s needs.

Compact charging station

Instead of the huge 50Hz chargers, there is now a compact charging station with eight 2kW Fronius Selectiva devices installed in the finished goods store. These are mounted close together on a stand, with the back-up batteries immediately below them – saving valuable space in the hall. Standing in front of the individual charging stations is a transfer trolley fitted with castors, which can easily be raised by hand to the desired height. “Changing the battery has never been easier,” says a delighted Lendi. “Forklift operators merely have to stop in front of the station and the transfer trolley takes all the effort out of changing the heavy batteries – it does not take much time, nor does it need the assistance of a second person.”

The Selectiva devices are also the only ones on the market to use the intelligent Ri charging process, which adapts each charging process individually to the condition of the connected battery. “Overcharging is therefore reduced to a minimum and we also save energy – by up to 30% compared with the 50Hz technology,” explains Baumgartner. This consumes less electricity and prolongs the service life of the batteries at the same time. The Ri charging process also greatly reduces gas formation during charging, as well as the water consumption of the lead batteries.

Fronius no longer specifically matches a forklift truck to a battery, instead it uses a so-called ‘chaotic battery pool’. This is controlled by the Cool Battery Guide Easy information and management system. An LED strip for each device indicates which battery has been connected the longest and is already fully charged. “So now, when an operator comes to the station to change the battery, they can see at a glance which battery is the next in line,” says Lendi. “This optimises the utilisation of our pool and also ensures an extended service life, as after they have been charged, the batteries always have enough time to cool down.”

Daniel Lendi is enthusiastic about the new Fronius charging technology. “The station has really simplified things for our employees,” he stresses. “It is now far easier, quicker and safer to change the battery than ever before.” The external start/stop function of the Selectiva devices also helps here. When changing the battery, the operator only needs to insert or remove the charging plug; there is no input required on the device itself. “The Ri charging process automatically identifies the ideal characteristic and the external start/stop prevents sparking when the charging cable is disconnected,” explains Baumgartner. This virtually rules out any incorrect operation that could endanger employees or damage batteries.

MORE INFORMATION: www.fronius.co.uk
Faster, quieter and more flexible

INTERROLL PRESENTS NEW HIGH-PERFORMANCE CROSSBELT SORTER

With the global market launch of the new MX 025H crossbelt sorter, Interroll has extended its portfolio of automatic sorting solutions to include a new high-performance system capable of handling up to 20,000 conveyed goods per hour. This new solution also allows much heavier and larger goods to be sorted. As a result, even the most demanding users can now enjoy the performance and availability benefits offered by mechanically driven horizontal crossbelt sorters from Interroll.

The MX 025H, offers an increased conveying speed of up to 2.5 m/s compared to 1.8 m/s for the still available Interroll Crossbelt Sorter ST 6160. The new sorter thus enables throughput rates of up to 20,000 conveyed goods per hour. At the same time, the MX 025H high-performance crossbelt sorter is able to transport goods weighing up to 50 kg. In addition, the width of the carriers has been increased by 50%. This means an enormous gain in flexibility when sorting goods of different dimensions.

Interroll says maintenance for the MX 025H is extremely easy and inexpensive, for a number of reasons. First of all, the drive chain has been replaced with a rubber belt. This means there is no need for lubrication. Secondly, it is now much easier and faster to replace the belt. However, extensive tests indicate this will not need to happen for many years, even in the case of 24/7 operations. The carriers can also be replaced much faster, and wear parts are also less expensive; all this contributes to significantly lower maintenance costs – around 50% less than with a conventional crossbelt sorter, claims the company.

Thanks to the mechanical drive concept, the sorter operates extremely quietly – with noise levels below 67 dB(A) – even at the highest throughput rates. In addition to extensive load and endurance tests in the in-house test centre, the new sorter has already been in use for almost a year at selected customers’ sites.

Executive vice president and head of products and technology, Jens Strüwing, says: “With our entry into absolute high-performance sorting, system integrators can now offer users an innovative and at the same time proven technology range. Our unique, mechanical drive concept enables us to process an increasing number and variety of goods according to demand – with the highest reliability and economic advantages that are unparalleled in the world market.”

One important reason for this global success is the basic mechanical principle of Interroll’s sorter platform. Today, more than 400 sorters are already in use worldwide by industry leaders such as Amazon, DHL, FedEx, UPS, Hugo Boss, Inditex (Zara), Zalando, Swiss Post, Austrian Post and China Post. Unlike competing products, the number of electronic components in these sorters has been kept as low as possible. The unique design principle ensures maximum availability, very long lifetime, minimum operating costs as well as short payback periods.

Interroll crossbelt sorters operate on a direct drive principle, in which the drive units can be positioned flexibly. The entire drive system offers power efficiency rates of over 85%. It is designed redundantly so that if one drive unit fails, the sorting operation continues uninterrupted. Compared to electrical sorting systems operated with traditional linear motors, Interroll says energy savings of up to 50% can be achieved. At the heart of the sorter are the crossbelt carriers with patented mechanical drives. The modular sorter platform also includes innovative infeed conveyors and terminals that can be customized to meet the needs of each user.

MORE INFORMATION: www.interroll.com
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Vacuum conveyor for non-woven strips

MK Profile Systems recently received a request for an application in the production of non-woven strips which required cut sections of non-woven fabric to be transported from one machining station to the next. The material was very thin and light with the system needing to run at a high speed of 140m/min.

The strips had to be transferred from one conveyor to the next without any damage and it also had to be possible to cut them again as they passed through the system. They had to maintain their position as they passed through the system with the conveyor technology needing to be integrated into a customer-provided frame. The system was required to be able to handle strips of various formats without retooling.

MK used a vacuum conveyor consisting of a belt conveyor with BC lower belt drive. The conveyor frames were made from square, stainless steel tubes, with each having a suction nozzle that allowed for maximum flow rate to establish the vacuum. Oblong holes run along the running side of the conveyor frames. A perforated belt allows the hair removal strips to be vacuum-gripped so that they can be securely transported even at high speeds. The conveyors are only 50 mm wide and are configured as eight-line conveyors. This allows the customer to switch the vacuum on or off in individual lines and configure the system for different strip widths. This ensures an optimal suction pressure in all cases.

The conveyors are equipped with ø19 mm rolling knife edges on both sides to achieve short transfer distances. The conveyor frames are equipped with welding bolts for mounting in the customer-provided frame. The conveyors are arranged such that the hair removal strips can be transported from one conveyor to the next. The transfer conveyors are positioned upside down with the running side facing downwards, allowing the hair removal strips to be transferred while suspended below the conveyor. They are then transferred to the top side of the next conveyor. This ensures reliable transfer. In some locations two conveyors are arranged atop one another so that stacks of hair removal strips can be clamped between the conveyors and then transported and cut without sliding.

The finished system has provided the customer with a very fast and reliable way of conveying a small, lightweight product. It is extremely versatile in operation and optimised for maximum flow rate with extremely short transfer distances.

MORE INFORMATION: www.mkprofiles.co.uk
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