PROCESS TECHNOLOGY

AUTOMATION + CONTROL + INSTRUMENTATION

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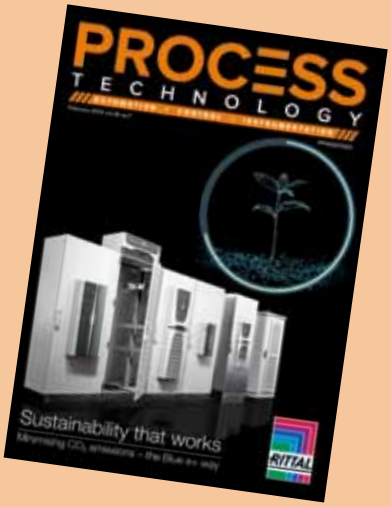
ON THE COVER



Rittal delivers efficient climate control solutions and smart service concepts to help reduce the carbon footprint of machines and systems. On average, a Blue e+ cooling unit saves 1 tonne of carbon per year, equivalent to the amount absorbed by a beech tree over 80 years. The Blue e+ series of products has a solution for every application and requirement.

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ROBOTS AND AUTOMATION

A CHANCE TO MAKE THINGS BETTER

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It is likely there will be a growing trend towards the adoption of robotic automation as skills and labour shortages increase.

The world is changing fast. In the last three years alone, we have seen an unprecedented combination of events, from the COVID-19 pandemic through to global conflict and supply chain disruptions that have shaken traditional business models and led businesses to look for new ways to improve their resilience against future shocks.

Automation and robotics present significant scope for boosting productivity in manufacturing and logistics applications. Offering the potential for faster, consistent and more efficient production with less waste, robots provide companies with the flexibility to adapt to changing conditions, making them especially well-suited to addressing many of the current challenges facing the Australian economy, including the growing shortage of skilled and available labour.

New technologies, new possibilities

As robotic hardware, software and AI technologies increasingly combine, new possibilities are opening for deploying robots in manufacturing applications. Today's robotic solutions can be used to achieve highly automated end-to-end manufacturing, with options encompassing everything from low payload cobots and fast picking delta robots through to modular solutions and complete cells for handling multiple operations. Examples of tasks that can be handled robotically include parts storage and retrieval, machine tending, welding, finishing and painting, quality inspection and logistics functions such as storage and retrieval, picking and sorting. The development of smart AGVs and mobile robots (AMRs) is also helping to boost efficiency, enabling the seamless transfer of parts or sub-assemblies between different production stations and ensuring that they are delivered where they need to be, on time and without error.

Globally, the benefits that this joined up approach to production can bring is seeing a steady growth in the adoption of robotics and automation outside of their traditional automotive stronghold, with a variety of industries, including food and beverage, pharmaceuticals, electronics, logistics and construction looking for ways to integrate robots into their operations.

Tackling SME concerns

Innovations such as cobots with simplified programming and user interfaces are also helping to address many of the concerns around complexity and affordability that have deterred small and medium-sized companies from investing in robotic automation, providing them with an easy and scalable path for learning how to integrate robotic automation into their operations.

The global market for collaborative robots is estimated to be worth US$12.30 billion by 2025, with a compound annual growth rate of more than 50%, according to research firm Markets and Markets. One key driver for growth is the development of collaborative robots for workplaces outside large manufacturing environments. While robotic automation technology has evolved to meet the growing demands for high-volume industrial production, it has also led to the creation of smaller collaborative robots that are designed to fit easily into existing production lines to increase productivity while working safely alongside people.

The inherent qualities of collaborative robots such as the ability to mount them on tables, walls and ceilings, and their easy-to-install and -program features make them ideal automation solutions for smaller manufacturers. With their smaller size and reduced need for peripheral equipment, collaborative robots are also much less costly to install, making them much more affordable to purchase and deploy.

> THE INHERENT QUALITIES OF COLLABORATIVE ROBOTS SUCH AS THE ABILITY TO MOUNT THEM ON TABLES, WALLS AND CEILINGS, AND THEIR EASY-TO-INSTALL AND -PROGRAM FEATURES MAKE THEM IDEAL AUTOMATION SOLUTIONS FOR SMALLER MANUFACTURERS.

Cobots provide the opportunity for inexperienced users to tackle the 'low hanging fruit' of simpler applications, with the experience gained enabling them to develop their understanding of what can be achieved with more complex set-ups.

Taking the pain out of change

The growing availability of tools such as digital twins, VR and AR, and offline programming and simulation software is also helping companies to find ways to optimise robot performance by enabling them to develop and test different configurations to find the best solution for their requirements.

The ability to model and refine robotic processes to find the optimum configuration is particularly beneficial for industries subject to rapid changes in consumer demands, such as the food and beverage and logistics industries. In these industries especially, requirements can change quickly due to shifting consumer demands, requiring production or handling lines to be adapted to accommodate new products or packages.

Robots and people: the best of both worlds

With the ability to handle an expanding range of tasks and work consistently around the clock, robots provide an ideal solution for enhancing working environments and productivity. Ongoing developments in robotic usability, performance and capabilities including vision, force control and path following have helped to broaden the applicability of robots across a range of tasks and applications, enabling them to be used to fill gaps in workforces caused by skills shortages. In many cases, this can enable companies to make better use of their existing skilled workforces by using robots either to take over lower value or dirty and more dangerous tasks or else to provide additional, much needed production capacity.

An agricultural equipment manufacturer, for example, introduced a robot to handle complex welding operations for a hedge-cutting attachment, enabling its experienced welding team to be deployed onto other lower volume, niche products. The resulting improvements, which included a 66% reduction in production times, helped the company to expand its production capacity, with extra products able to be handled by the robot and the manual workers being used for fast turnaround tasks and those which are too large for the cell to handle.

Another example is an Italian company that specialises in the production of high-end handles, knobs and trimmings for consumer and professional appliances including ovens, refrigerators, cooktops, stoves and microwaves. The company was facing increased competition that required improved manufacturing productivity and a greater range of options for customers in lots ranging from very few parts to thousands. At the same time, it wanted to continue its people focus by using automation to enhance jobs rather than replacing them.

To achieve this, the company installed a robotic cell incorporating a collaborative robot. The cell was designed and

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Cobots enable factories to combine the inherent adaptability and judgement of its human workers with the robot's speed, dexterity and ability to consistently perform repetitive production tasks.

engineered anthropometrically around the operator, so all activities in the installation are ergonomically managed. A simplified touch screen interface was created, allowing workers without specialised robot programming skills to successfully operate the application and easily accommodate changes between products. The cell enables the company to combine the inherent adaptability and judgement of its human workers with the robot's speed, dexterity and ability to consistently perform repetitive production tasks. Workers now have more of an interesting supervisory role for the application, while the robot performs jobs that are not ergonomically comfortable for people, such as tightening small screws at awkward angles in confined spaces.

Since installing the cell, the company has increased its throughput, with orders able to be processed more quickly. Improved worker performance achieved by delegating arduous and repetitive tasks to a robot has also meant that average productivity has increased by 20%.

Preparing for a robotic future

With many companies citing a shortage of expert robot operators as a key reason for not switching to robotic automation, there is a need to ensure that both current and future generations of workers can access the training they need to be able to use robots.

For this reason, robot manufacturers have devoted considerable effort to designing training programs aimed at all levels of ability, enabling operators to develop their skills from basic through to advanced levels. At the grassroots level, specific efforts have also gone into developing packages for schools, colleges, and universities, combining both robots and programming tools to equip students with the knowledge and experience needed to develop, build and maintain robotic solutions for manufacturing applications.

At the university level especially, this can also have the benefit of helping to identify new ways for robots to be used to deliver improvements or solve problems. University research, for example, was the starting point for a new flat panel display recycling solution that has been developed by an Irish start-up. The company's solution combines robotic automation and AI to enable the sustainable dismantling of computer and TV flat panel displays, separating out harmful chemicals and valuable components for recovery and reuse rather than sending them to waste.

Innovating for the future, today

As skills and labour shortages encourage companies to look for new ways of manufacturing and distributing their products, it is likely there will be a growing trend towards the adoption of robotic automation as a way of shoring up their workforces. These possibilities are likely to expand as robot manufacturers and their partners work to develop enhanced software features such as cloud connectivity, artificial intelligence and machine learning that increase their functionalities and make them safer, more adaptable and flexible and easier to use.

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The AIR-500D high-performance AI system supports dual NVIDIA RTX GPUs to be able to process large datasets and compute-intensive workloads.

Advantech Australia Pty Ltd

https://bit.ly/3wSrtd2

CONNECTORS FOR SINGLE-PAIR ETHERNET

HARTING has introduced its T1 Industrial connector range for Single-Pair Ethernet along with its ix Industrial miniaturised Ethernet interface.

HARTING Pty Ltd

https://bit.ly/3jqewUB

Wireless technology enables AGVs to increase production efficiency

A Swedish manufacturer of heavy vehicle components wanted to eliminate manual and heavy lifting processes within its production lines, and tasked Swedish Löfqvist Engineering with designing and implementing a new automated solution for its large production area.

The solution involved the manufacturer's existing machine centres, which performed all production functions such as turning, reaming and hardening. These were being replaced by eight automated, function-specific production cells that produce the various vehicle components. Critical to the project was the integration of these production cells, and the efficient movement of components between the cells, and in and out of the production facility.

This labour-intensive task had previously been performed manually, which involved much heavy lifting and was inefficient. The manufacturer initially considered fixed conveyor belts, but concluded that AGVs would be a more productive solution that would also provide greater flexibility when adapting to changing production demands.

Löfqvist Engineering developed and implemented three AGVs to move specific components to the appropriate production cells, while a fourth was fitted with a mobile cobot to perform quality checks on the parts. Because the AGVs move freely between the production cells to supply and collect components as required, reliable wireless communication is essential.

Löfqvist Engineering has a long and trusted relationship with HMS Networks, and opted to implement an Anybus wireless communication solution for this new production system. HMS Networks engineers supported Löfqvist Engineering in implementing the solution, which included mounting two Anybus Wireless Bolt devices on each of the AGVs to enable connection to a wireless network via Bluetooth or Wireless LAN.

A Wireless Bolt is a compact, all-in-one package that features a connector, communication processor and integrated antenna in the same unit, with IP67 protection. Because of the limited space available on the AGVs, this compact form factor was critical. One Wireless Bolt is connected to an onboard Omron PLC (that manages the AGV's movement and safety functions) and provides communication with a central supervisory PLC system.

The second Wireless Bolt is connected to the AGV's robot controller and provides wireless access to remotely configure or troubleshoot the AGVs via a browser on a handheld device.

Because the manufacturer's overall production area is so large, the solution required three Anybus Wireless Access Points (APs). These industrial-grade infrastructure hubs are installed at strategic points to form the wireless network and ensure an overlapping coverage area that facilitates roaming.

The Anybus devices support the IEEE 802.11r standard for fast roaming within a wireless network. This is useful for applications involving AGVs, where seamless connectivity is required across the entire factory floor to ensure that the AGVs are always in contact with the network.

Wireless roaming is when a client device moves around in an area with multiple APs and may automatically switch from one AP to another that has a stronger signal. Without fast roaming support, that transition would require the client to re-authenticate. As a result, there could be a delay and loss of connection, which could trip an emergency stop, thereby impacting production efficiency.

However, with fast roaming, client devices are authenticated to the first AP and their credentials are forwarded to the next AP prior to roaming, which eliminates the need for re-authentication. This significantly reduces the handover time, while still maintaining network security.

"The factory floor is a tough and demanding industrial environment, so it was essential for us to develop a robust communications network with good functionality," said Anders Unefäldt of Löfqvist Engineering, "The rugged design and high reliability of the Wireless Bolts and APs used in the HMS Networks Anybus solution was ideal in meeting our requirements."

The supporting wireless network infrastructure also uses an Anybus X-gateway to provide seamless communications between the onboard and supervisory PLCs. Because the AGVs employ automation technology from different vendors, this created a situation where different data communication protocols were used.

For example, the Omron PLC that uses EtherNet/IP communications over the wireless network needs to connect to a Siemens supervisory system that uses Profinet communications. The Anybus X-gateway simplifies this multi-vendor PLC solution by translating between EtherNet/IP and Profinet.

The AGVs are operating almost continuously, which has enabled the manufacturer to increase production to 5000 units a week, with spare capacity available to support future growth.

HMS Industrial Networks

hms-networks.com

OPTICAL SENSORS

The Pepperl+Fuchs ML100 series optical sensors offer high optical performance and are suitable for cold-storage applications down to -30°C. They were first launched with the standard versions but now offer 22 different versions, each developed to specifically solve different problems.

The series includes retro-reflective sensors with polarisation filters, diffuse mode sensors with or without background suppression, thru-beam sensors and other variants to solve specific problems including variants with PowerBeam and BlueBeam. Mounting is easy with an M3 metal thread, and they have a highly visible bright emitter LED, IP67-rated housing material and low current consumption at less than 20 mA. The ML100 series is insensitive to ambient light, including high-frequency fluorescent lamps, and also offers sensitivity adjustment and LO/DO adjustment.

Pepperl+Fuchs (Aust) Pty Ltd
www.pepperl-fuchs.com

FLOW SENSOR WITH PLAIN TEXT DISPLAY

Turck has added the FS101 flow sensor to its FS+ fluid sensor range. The updated FS+ devices have a 4-digit, 12-segment display that shows the flow rate value as a percentage of the setpoint.

The IO-Link smart sensor profile simplifies replacement of IO-Link flow sensors from other manufacturers with FS+ devices as process data, parameters and functions are standardised.

The FS101 retains the Turck Quick Teach and Delta Flow functions that already simplify commissioning in the existing FS100. Delta Flow ensures that the teach-in is not performed until the warm-up phase of the temperature peak is completed and a constant flow is present. This avoids a frequent source of errors seen in traditional parameterisation processes. Users also benefit from the trouble-free operation via capacitive touchpads. Turck will continue to offer the earlier FS100 devices with a bar-graph display.

The Turck flow sensors can be used in many applications including the monitoring of flow in coolant circuits or for dry-run protection in pumps.

Turck Australia Pty Ltd
www.turck.com.au

PROFILE SENSOR FOR WELDING ROBOTS

Automated weld seam tracking in robot welding cells is a complex task in a harsh industrial environment. The micrometre-accurate detection of the guide point with different types of joint by 2D/3D profile sensors is one of the most effective solutions for this challenge. In combination with Wenglor's uniVision software, the weCat3D MLZL 2D/3D tracker sensor is designed to combine the necessary precision and profile quality with convenient installation, integration, robustness and user-friendliness.

The Wenglor MLZL is a 2D/3D profile sensor made for welding robots, with integrated cooling and rinsing, and that enables easy and space-saving installation directly on the welding torch. Due to the small housing dimensions of 33 × 183 × 69.8 mm, the robot can therefore also operate in narrow corners.

The MLZL 2D/3D profile sensor does not require any additional protective housing, nor does it need to be tilted for alignment: the design offers sufficient protection against welding spatter and ambient light.

The MLZL relies on the same laser technology of the weCat3D series and has been specially adapted and optimised for the demands of welding robots, and in particular for the complex task of optical tracking of weld seams.

Despite the harsh industrial environment, the welding sensor provides high-quality profiles for precise joint detection. Optionally equipped with a red or blue laser, users can choose between three laser classes: 2M, 3R or 3B.

Treotham Automation Pty Ltd
www.treotham.com.au

CLAMP-ON ULTRASONIC FLOWMETER

In the petrochemical industry it is vital that a tanker is unloaded as quickly as possible, but this must be done within the acceptable limits of safe operation. As the rate of discharge increases, the static electrical charge in the line also increases, which increases a risk of sparking. The task is to ensure a flow velocity below 3.5 m/s to maintain a flow without sparking.

The Katronic KATflow 170 ATEX non-invasive, clamp-on ultrasonic flowmeters are designed to ensure that a variety of petrochemicals are discharged into storage as quickly, efficiently and safely as possible without intruding into the process flow. The KATflow 170 uses compact, explosion-proof clamp-on sensors to measure the flow, and through the ATEX-certified KATflow 170 base unit, the flow rate is reported to the on-site control system, which finally modulates the pumped volume. Non-invasive flow measurement means the measurements are uncomplicated while maintaining all occupational safety regulations.

All flowmeters in the KATflow series have several built-in tools that facilitate device set-up and transducer mounting. The quick installation wizard guides the meter user step by step through each application and provides dynamic feedback on signal strength and thus measurement reliability when the meter is set up. A second Audible Positioning Assistant uses acoustic signals to enable the operator to quickly find an optimal sensor positioning on pipelines.

AMS Instrumentation & Calibration Pty Ltd

www.ams-ic.com.au

INDUCTIVE POSITION MEASURING SYSTEM

Balluff has launched the BIR (Balluff Inductive Rapid Positioning System) range of fast inductive position measuring systems.

In addition to a high repeatability and a measuring frequency of greater than 10 kHz, the BIR offers a large, adjustable measuring range and a compact, flat housing with small blind zones.

The system is designed for use in stamping presses, industrial robots, factory automation systems and packaging lines, among others. The BIR range can also be utilised in the areas of laser cutting and 3D printing.

The BIR features integrated temperature monitoring via IO-Link. The options for continuous condition monitoring, the flexible interfaces, and the simple parameterisation and diagnostics via IO-Link reduce setup and changeover times. By facilitating troubleshooting, BIR contributes to avoiding the downtime of machines and equipment.

Balluff Pty Ltd
www.balluff.com.au

RADAR LEVEL AND FLOW TRANSMITTERS

Emerson has introduced the Rosemount 1208 level and flow transmitter series. The non-contacting radar transmitters are designed to help increase the operational efficiency of water, wastewater and process industry utility applications.

Operators in the water and wastewater, food and beverage, chemical and other process industries often deploy ultrasonic and hydrostatic devices for water monitoring applications when radar transmitters are considered too expensive, bulky or complex. The Rosemount 1208 is an alternative, featuring 80 GHz fast-sweep frequency modulated continuous wave (FMCW) technology on a single electronic chip, which delivers measurement within a compact and more cost-effective device suitable for applications with space constraints or compliance requirements, such as water applications.

The measurement accuracy of the Rosemount 1208 is unaffected by most process conditions, including condensation and variations in pressure, temperature and density. By using fast-sweep FMCW technology and internal algorithms, the transmitter can achieve a level measurement accuracy of ±2 mm at a range of 15 m. In addition, the non-contacting design has no moving parts or calibration requirements, creating a virtually maintenance-free device that minimises manual procedures.

The transmitter is available in two models, offering different communication protocols and approvals. The Rosemount 1208A offers IO-Link connectivity as part of its hybrid communication options that also include three-wire 4–20 mA and switch outputs.

The Rosemount 1208C offers two-wire 4–20 mA and HART communication options, providing access to advanced diagnostics. Hazardous area approval enables use in areas where an explosive gas atmosphere could occur during normal operation.

Emerson Automation Solutions
www.emerson.com/au/automation

GAS LEAK TRANSMITTER

The Dräger Polytron 8900 UGLD transmitter is an early warning area monitor for detecting high-pressure gas leaks in outdoor industrial process environments.

Utilising an ultrasonic acoustic sensor, it responds earlier than conventional gas detectors because it registers the sound of leaking gas instead of measuring the concentration of accumulated gas clouds.

Loud process areas generate noise which is mostly in the audible spectrum. Gas leaks from pressurised vessels above 10 bar generate both audible sound and inaudible ultrasound. Since Polytron 8900 is tuned to measure in the ultrasound spectrum, it can easily identify gas leaks with a leak rate of 100 g/s in a 20 m radius circle.

The measured values on the display of the Polytron 8900 UGLD are shown from 0 to 100% of the full-scale decibel sensitivity range. The ultrasound level is immediately displayed and transmitted and allows for an easy interpretation. Alarms are configured at a specific level above a predetermined background noise level. Additionally, a time delay of up to 30 s can be set in the control system.

The Polytron 8900 UGLD is an explosion-proof transmitter with a sensor housed in a galvanically isolated, intrinsically safe enclosure. The sensor is an ultrasonic microphone that is completely sealed in PVCC, making it impervious to water and dirt. Regular calibration is not necessary, but calibration is possible and easy with the offered calibration kits. The expected lifespan of the ultrasonic sensor is more than 10 years.

Draeger Australia Pty. Ltd.
www.draeger.com

NATURAL GAS ANALYSER

ABB says its Sensi+ analyser offers a reliable solution that simplifies and reduces the cost of gas pipeline operation and maintenance. It is designed to enable safer, easier and more efficient pipeline monitoring and operations through a single device that can analyse up to three contaminants (H_2S, H_2O and CO_2) in any natural gas stream accurately and in real time. Its fast response also enables quick reaction to process upsets, thus helping to reduce waste and methane emissions.

Mitigating the risk and effects of natural gas contaminants can often present a challenge to natural gas pipeline operators, process industries and natural gas utilities, with companies required to manage numerous technologies and devices to obtain a complete analysis. This legacy approach is complex, failure-prone and expensive. Traditionally, each contaminant has often required a separate analyser, maintenance schedule and specific skill set to operate, validate and service.

ABB says that Sensi+ requires about six times less sample flowrate for its measurement than other technologies, reducing the total carbon emission of the analyser and natural gas wastage in the atmosphere.

The hazardous area compliant analyser needs only a simple wall-mount installation and process tie-in without complex system purging. Following installation and validation, ABB says the analyser will deliver fast and reliable measurements in the field without calibration.

The Sensi+ analyser includes ABB's AnalyzerExpert features that provide experts with actions and insights directly from the device. Capabilities include built-in self-diagnostics, automated laser line-locking, real-time cross-interference compensation and health monitoring.

ABB Australia Pty Ltd
www.abbaustralia.com.au

IO-LINK SENSORS: WHERE IT ALL WENT RIGHT

Ken Collishaw, Product Manager, Turck Australia

iStock.com/zorazhuang

IO-Link has enabled more comprehensive sensor communication, enabling sensor condition monitoring, while making set-up and maintenance easier.

In various and evolving forms, sensors have long been an integral component of industrial automation. They perform what initially appear to be very simple tasks, and for the most part they just let the control system know when something is present, absent, correct, incorrect or at a specific position or measuring point.

Of course, it isn't really that simple. To address the huge variety of automation applications there also needs to be a huge variety of sensors, and choosing the correct sensor for an application is not always straightforward. There are different devices available to detect or measure different materials and there are sensors for speed, temperature, pressure, colour, vibration, humidity, angle, flow, vibration and much more.

There is also a dauntingly wide range of sensing principles in use including, but not limited to, inductive, photoelectric, capacitive, magnetic, ultrasonic, radar, guided microwave, magnetostrictive, mechanical, MEMS, gyroscope, infrared, vortex and calorimetric.

After the introduction of non-contact sensors (usually three-wire devices) the basic operation of sensors stayed the same for a very long time. The sensor was powered up and, when specific set parameters were met (or not met), a signal was sent to the control system. Prior to Industry 4.0, and with a few rare exceptions such as a remote teach wire, the flow of information from sensors was all one way from the sensor to the control system and the information passed on was limited to basic digital or simple analog signals.

Industry 4.0 — and more specifically IO-Link — has now given us the ability to get much more from our sensors and also made using the sensors much easier. There are several ways in which this applies.

Connectivity

Using IO-Link sensors can save on connectivity costs. Most of us by now are familiar with the major benefits of remote I/O when compared to 'traditional' hard wiring. These include reduced physical wiring, the reliability of pre-made connectivity and the easy identification of faults. IO-Link technology adds a further level of cost savings when sensors with analog outputs are used. Shielded cables are no longer required and, when a full IO-Link system is used, there is no longer the need for any costly individual analog input cards. Connectivity from the IO-Link master to the control system is via fieldbus but the IO-Link sensor connections are point-to-point from each device to the IO-Link master using standard and reasonably priced industrial connectors, which are usually pre-moulded, double-ended M12 cordsets.

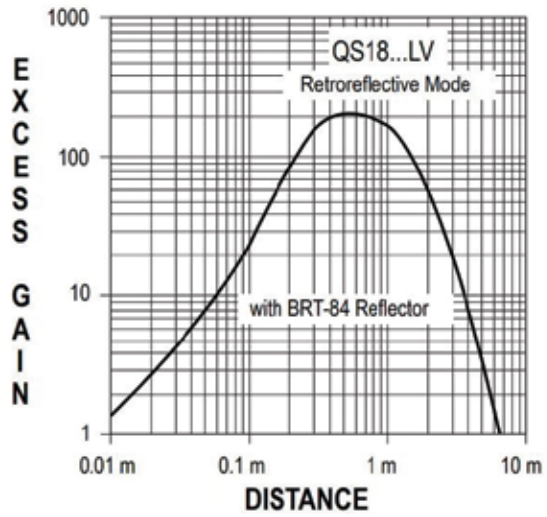


Figure 1: The excess gain graph shows the expected excess gain for a specific device with a specific reflector across its rated sensing range. Anything over 1 will operate correctly but higher levels (10 minimum) are recommended to compensate for soiling and misalignment.

Condition monitoring

Previously, the data received from sensors has been pretty much limited to one, or occasionally two, simple digital signals and the odd basic analog measurement signal. This level of data provides you with the information that you need, but in the ideal world it is probably not everything that you really want. But for a long time that was all that was available.

For the most part, sensors are robust devices that reliably work right up until they don't — and when they don't, they should just be replaced. Some sensors, however, such as optical sensors, will require regular maintenance like cleaning to keep them operating correctly. The interesting question here is how frequently? If you don't do the maintenance often enough, you get failures during production and if you do it too often, you are wasting resources and people will eventually devalue the importance of it.

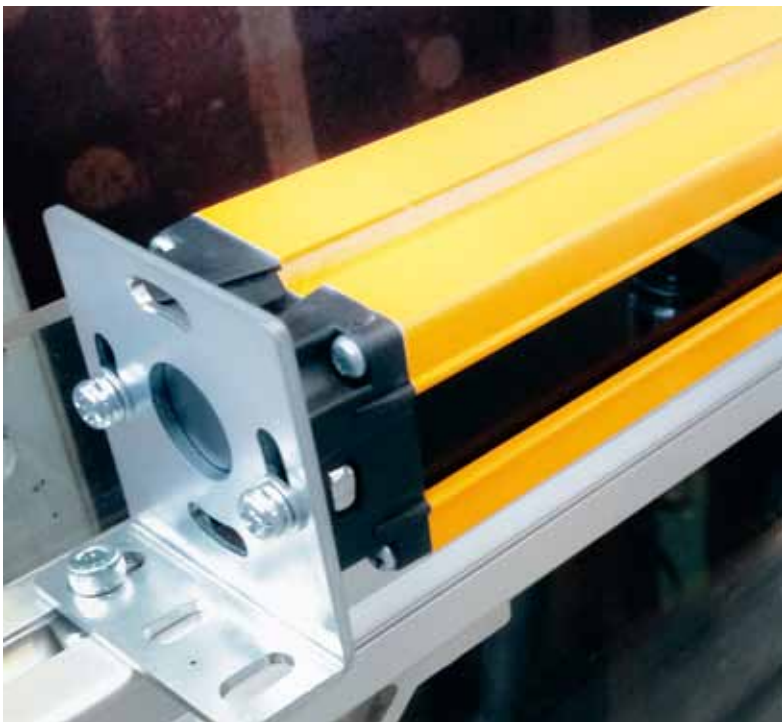
Picture a retro-reflective optical sensor installed in an occasionally dusty environment where the sensor is not cleaned. When the device is installed the receiver element sees a lot more of the transmitted light than it needs in order to operate, and this 'extra' light is known as excess gain. As dust slowly accumulates on the lens of the device or on the reflector, it reduces the amount of light that reaches the receiver. When the light received finally drops too far there is no longer any excess gain, and the device then sees the beam as blocked and the output switches on continuously. This failure usually shuts down the whole line and production stops until the fault is diagnosed and the sensor is cleaned. The cost in faulty product, lost production, idle workers and the 'knock down effect' of having other machines that are idle during this period can be substantial.

With some IO-Link retro-reflective optical sensors, whenever the sensor is not blocked you can monitor the level of excess gain. Simply setting an alarm trigger point on the excess gain in IO-Link means you can take the guesswork out of maintenance and clean the device only when it is needed. This will give enough notice for the cleaning to be done during scheduled downtime. This solution remains effective as the device ages and the intensity of the emitter deteriorates, reducing the level of excess gain available, or when there are mechanical issues that create gradual misalignment of the reflector.

Other condition monitoring benefits of IO-Link, depending on the device, include being able to monitor internal device temperature, operating hours, voltage and a host of other parameters. All of this can combine to provide a warning if there is a change in external conditions that may indicate other issues that need to be addressed, and it will also give us a much better indication of the expected lifetime for each unit, enabling us to plan our maintenance in an informed manner.

Configuration

In the Australian market our manufacturing lines need to be versatile. In most cases we simply do not have the volume requirements to run a dedicated line for each individual product that we produce. This means product changes, and at every change we potentially



> ONE OF THE MAJOR FEATURES OF IO-LINK IS IT PROVIDES YOU WITH THE ABILITY TO TRANSMIT INFORMATION TO THE SENSORS AS WELL AS RECEIVE DATA FROM THEM.

need to make mechanical adjustments and reconfigure at least some of the sensors.

Adjusting the sensors can be a bit of a task. In some rare cases we need to physically move the sensors, but this is fortunately now the exception rather than the rule. Usually, they are adjusted using a potentiometer, teach buttons or an onboard configuration sequence.

When sensor adjustment during a product change is required, just getting access to them can be a challenge. This can be due to other activity on the line or due to the sensors being in awkward locations where access can involve discomfort, the risk of injury, potential contamination or equipment damage. When you finally get to where the sensor is mounted, there is the added challenge of remembering the different teach processes and sequences for each device.

Picture an ultrasonic level sensor mounted in the top of a large enclosed tank. You are doing a product change and you need to adjust the switch point settings in the device. To access the location, you must climb a long ladder and then crawl across the top of the dirty tank in a narrow gap between the top of the tank and the roof of the factory. Often it is a stinking hot or freezing cold day — of course. When you reach the device you need to remember how to change a level setting, do the task and then carefully find your way back down again.

iStock.com/tickcharoen04

One of the major features of IO-Link is it provides you with the ability to transmit information to the sensors as well as receive data from them. This means that, in applications such as the one above, once the sensor has been installed all configuration and adjustment can be done remotely from anywhere that you have access to your control system and it can be done live while the system is running. In the event of a sensor failure IO-Link also facilitates automatic parameter setting. When this is utilised, any failed or damaged device that is replaced with an identical unit is automatically configured to be the same as the previous unit and production can resume immediately. This can save a lot of time and stress.

Some IO-Link solutions, for example radar level sensors, also have an integrated web server that can be used to visualise the signals being returned and this enables the user to ensure the device is configured so that it ignores interference signals and just looks for the required target.

Summary

From a sensor point of view IO-Link has enabled us to communicate much more comprehensively. It's sort of like our stereotypical teenage sensors that ignored the world around them, wouldn't listen and only communicated in grunts with the minimum possible information have now suddenly turned on their senses and joined the world. They have grown up and they are now mature adult sensors that communicate meaningfully and contribute positively to the conversation.

We now have a substantially greater amount of sensing, feedback and condition monitoring data available from our sensors and we can also configure them remotely, all without the need for any additional wiring. In this age of Industry 4.0, where improved technology has provided us with the capacity to collect and analyse much more data, this added functionality enables us to get a much better handle on what is going on in our facilities and what actions we need to take to maintain peak efficiency. Maintenance will always be partially reactive, but with the comprehensive information that we can now collect and process we can increase the amount of proactive work we do and in the long run this will make our sites more reliable and efficient.

Turck Australia Pty Ltd
www.turck.com.au

DAIRY DUMPING-CONVEYING SYSTEM

Flexicon's manual dumping system with integral conveyor and separate dust collector is suitable for dairy powders, pharmaceutical products and contamination-sensitive bulk foods.

Designed and finished to 3-A sanitary standards, the system comprises a manual dumping station with surge hopper, flexible screw conveyor and support boom on a castor-mounted frame, plus a separate mobile dust collection system that can be configured alongside or remotely.

The hopper is equipped with a mechanical agitator assembly to promote uninterrupted flow into the charging adapter of a 3 m flexible screw conveyor with a stainless steel screw engineered for the conveyed product. Fully enclosed in a polymer tube inclined at 45 degrees, the flexible screw is the only moving part contacting material, and is driven by an electric motor beyond the point of discharge.

A quick-release end cap allows removal of the flexible screw from the lower end of the crevice-free conveyor tube for rapid sanitising and inspection of both components. Safety interlocks prevent operation of the conveyor during screw removal or separation of the dust hood from the surge hopper.

The standalone dust collector is equipped with an automatic reverse-pulse filter cleaning system with stainless steel air reservoir rated at 99.99% collection efficiency for materials with particle sizes of 5 microns or greater. The raised height of the unit allows gravity discharging of accumulated dust into mobile bins, drums or other vessels for disposal, or reintroduction in select non-dairy applications.

Flexicon Corporation (Aust) Pty Ltd
www.flexicon.com.au

THERMAL CAMERA FOR USE IN HOT WORKING ZONES

Teledyne FLIR has announced the launch of the FLIR Cx5, a pocket-portable thermal camera for condition monitoring in hazardous environments. The FLIR Cx5 has a rugged ATEX-compliant case, which allows users to safely monitor electrical or mechanical assets in hot working zones.

Potentially explosive environments, such as oil and gas plants or chemical plants, need to be protected from ignition sources. Electronic devices used in these hot work environments need to comply with ATEX Product Regulations or similar regulations (IECEx). The 160 x 120-pixel FLIR Cx5 is mounted in a rugged enclosure, which enables users to work confidently while maintaining safety.

The FLIR Cx5 case has shock absorbers and the lens is protected by a germanium window with anti-reflective coating. The 3.5-inch colour display is protected by armoured glass and is touchscreen compatible. A rugged lanyard point can be removed in safe environments to reach the data storage and charging port.

The FLIR Cx5 features a FLIR Lepton thermal imaging sensor and FLIR MSX (Multi-Spectral Dynamic Imaging) technology, which embosses visible scene details onto thermal images. This results in a crisp thermal image, enabling inspectors to pinpoint hidden problems instantly.

FLIR Cx5 is compatible with FLIR Ignite, a secure cloud storage solution that allows users to directly upload, edit, organise and share their images.

Teledyne FLIR
www.flir.com.au

FANLESS EMBEDDED COMPUTER

The iBase AMS310 is a fanless embedded computer claiming high performance and low power consumption with an operating temperature range from -10°C to 60°C.

Built with a passive finned heatsink that provides an efficient and effective transfer of heat away from components, the AMS310 box PC houses the IBASE MB310 customised board with Intel Q470E PCH to support 10th Gen Intel Core i7/i5/i3 desktop processors. It allows the connection of up to six antennas, offering industrial-grade connectivity using M.2 2030 E-Key and 3052 B-Key for WLAN/4G/5G connections.

The AMS310 compact platform measures 275 x 150 x 70 mm and accommodates up to 64 GB DDR4 system memory. The rear panel provides connectors for HDMI, DP, line-out, six USB ports, two COM ports, two RJ45 ports for Ethernet, and 24 VDC power. System storage is supported by an externally accessible 2.5″ drive bay and an M.2 M-keyed socket for fast NVMe SSDs. Other features include TPM 2.0 security, over/under/reverse voltage protection and multiple OS support.

Backplane Systems Technology Pty Ltd
www.backplane.com.au

TERMINAL BLOCKS FOR MULTIPLE CONDUCTOR TYPES

The XTV terminal blocks from Phoenix Contact can accommodate the direct insertion of all conductor types: ferruled, solid or stranded wires.

Push-X technology operates similarly to Phoenix Contact's Push-in Technology (PT) but uses a preloaded mouse trap design that keeps the leg spring depressed. As a result, the technician only needs to apply enough force to unlatch the spring and directly insert any type of wire. In traditional PT, the technician completely depresses the spring, so it cannot accept stranded wires.

Tapping the inserted conductor triggers the preloaded contact spring and automatically establishes safe contact. This reduces installation time and enables fast wiring without tools or force. To release the conductor, the technician presses the orange push-button, the same method used in Push-in Technology. The push-button always displays the chamber position clearly, regardless of the conductor diameter and orientation of the terminal block.

The initial XTV range includes three cross-sections: 6, 10 and 16 mm^2. Push-X technology has been tested beyond the standard requirements, making it suitable for industries that place high requirements on vibration, gas tightness and robustness. The range is fully compatible with the CLIPLINE complete terminal block system, making it easy to combine with other Phoenix Contact terminal blocks and accessories.

Phoenix Contact Pty Ltd

www.phoenixcontact.com.au

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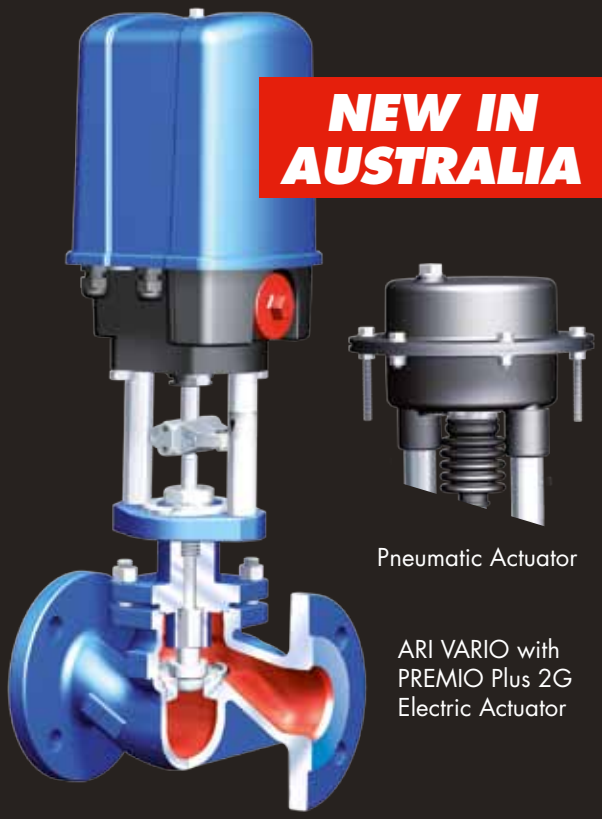

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PRESSURE REGULATORS SUITABLE FOR OXYGEN

With the latest Mini pressure regulator series from Witt-Gasetechnik, small flow rates can be controlled precisely. The compact pressure regulators can be used for oxygen and carbon dioxide, for fuel gases such as hydrogen, methane or propane, and for technical gases and compressed air.

The fittings are suitable for applications with high demands on accuracy, eg, for analysis technology, and for sampling and dosing, as well as for small burner systems or as pilot pressure regulators. Both in-line and panel mounting are possible.

One feature is that they are explicitly suitable for use with oxygen. Witt has designed the Mini pressure regulators specifically for oxygen (per EIGA 13/20 and CGA G-4.4) and uses elastomers that are proven to be resistant to oxygen. In addition, all components are subjected to a double cleaning process in accordance with EIGA 33/18 and CGA G-4.1 to offer high levels of safety in oxygen applications.

The spring-loaded mini pressure regulators are optionally made of brass or stainless steel and have G 1/8″ connections. The maximum inlet pressure is 25 bar, and three pressure ranges can be selected for the outlet pressure: 0.5–3 bar, 10 bar or 16 bar. The regulators can be used in a wide temperature range from -30°C to +60°C. Two versions are available: non-relieving or relieving with secondary venting. A pressure gauge is available as an option.

Niche Gas Products
www.nichegas.com.au

UNIVERSAL HIGH-SPEED THERMOCOUPLE MODULE

The IOLITEir-8xTH-HS is an updated version of the Dewesoft 8-channel IOLITE thermocouple temperature module. It's a channel-to-channel isolated DAQ device for thermocouple temperature measurements using universal thermocouple inputs: K, J, T, R, S, N, E, C and B.

The device addresses the need for stable temperature measurements in EMC-harsh environments, such as on the stator of an electric motor or near inverters. The module not only improves the EMC immunity of the previous unit on the digital side but also utilises a sharp analog antialiasing filter (3rd order, -3 dB @ 1 kHz) and digital FIR filters to remove unwanted frequencies.

The input connector of the module is MINI TC for the universal thermocouple type. It offers sensor break detection in the software and applies physical LED indicators.

The module uses a 24-bit ADC with sampling rates up to 10 kS/s per channel, enabling the IOLITEir-8xTH-HS to be used in dynamic and demanding applications to record transients of temperature shock.

A higher sampling rate enables Dewesoft filtering technology using digital FIR filters to reduce the noise floor down to -130 dB and reach a resolution of less than 1 μK.

The IOLITEir-8xTH-HS is equipped with two EtherCAT buses in parallel for both DAQ and real-time control.

Metromatics Pty Ltd
www.metromatics.com.au

WIRELESS REMOTE ACCESS GATEWAY

HMS Networks has released its next generation of Ewon industrial remote access gateways. Featuring built-in hardware security, the Cosy+ range allows users to access PLC-based machines securely from anywhere, and do commissioning, troubleshooting and programming online. With the Cosy+ Wireless version, users can connect to their machines via Ethernet, Wi-Fi or cellular link depending on the industrial situation, enabling support of machines by using secure remote access. The remote access to Ewon Cosy+ gateways is done over the Talk2M industrial cloud service.

The Cosy+ wireless range includes several layers of security and due to a partnership with cybersecurity firm NVISO, Ewon offers a remote solution that is scalable and tested according to today's cybersecurity standards.

HMS Industrial Networks
hms-networks.com

DENSITY AND MASS FLOW MEASUREMENT WITH THE TYPE 8098 FLOWAVE MULTIPARAMETER MEASURING DEVICE

Density and mass flow can now be measured and monitored with the compact and low-maintenance FLOWave flowmeter.

The use of the type 8098 FLOWave not only reduces the number of devices in a plant, but also reduces costs and effort in plant planning, installation, start-up and maintenance. Thanks to the well-thought-out device construction with only one line and seal, FLOWave is easy to clean and also requires fewer calibrations compared to similar products. The possible uses for FLOWave have now been expanded due to the additional measuring parameters of mass flow and density.

It is a compact solution: as a device for multiple measured quantities and applications the Type 8098 FLOWave can measure more than just flow. For example, the sensor recognises the change of liquids and gas bubbles in the medium. To do this, the device simultaneously records different measuring parameters and analyses them:

- Volume flow
- Temperature
- Acoustic transfer factor
- Differentiation factor

Usually multiple devices are required in order to monitor all these parameters. FLOWave combines these measured quantities in one device, and is also now in a position to determine other measured quantities.

New measured quantities of FLOWave

Density (in kg/l, g/cc etc.)

Density means the ratio of mass to volume. FLOWave determines density using the acoustic parameters of the liquid. The advantage is that the measured value can be directly included in the ongoing process at a set measurement point.

Mass flow (in t/h, kg/min, etc.)

Mass flow is a dynamic mass per time unit and is defined as the mass of a medium that is moved through a cross-section over a period of time. In measurements with surface acoustic wave (SAW) technology, which is also used in the FLOWave, the mass flow is calculated using the measured values of density and volume flow. In contrast, other measurement principles such as Coriolis use mass flow and density to deduce the volume flow.

These additional measured quantities are available for new FLOWave devices and can be added when purchasing, depending on requirements. Users can decide for themselves which functions they really want to use. For devices that have already been commissioned, it is unfortunately not possible to activate the additional measured values due to technical differences, as these may impact measurement accuracy.

Additional functions open up other areas of use

FLOWave has been used in a wide variety of processes since 2015 and will support users with flow measurements of all kinds, with its advantages being of particular use in the pharmaceutical and food and beverage industries. Due to the new measured quantities, the Type 8098 can be used in the following applications, for example:

- Measuring the flow of cooking oil
- Measuring the mass flow of liquids in pharmaceutical applications
- Blending and mixing alcoholic and non-alcoholic beverages

Benefits at a glance

- A device for multiple measured quantities ensures low installation costs and time-saving device management.
- Permanently stable process values, no losses of pressure and easy cleaning due to well-thought-out device construction.
- Seamless process monitoring enables quick action in the event of faults, such as changes to the liquid.
- IP65 degree of protection, ATEX, IECEx or CRN for use in demanding environments.
- Hygienic stainless steel device design.

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FLUID CONTROL SYSTEMS

Burkert Fluid Control Systems
www.burkert.com.au

ETHERCAT TERMINAL

Beckhoff's EL8601-8411 EtherCAT Terminal offers increased flexibility in a compact design as a 12-channel multi-interface system that is 12 mm wide. It is therefore suitable for applications where only a few complex signals are required as well as in special-purpose machine building, where its flexible signal configuration enables minimised storage.

The EL8601-8411 EtherCAT Terminal offers a combination of up to 12 signal interfaces (eight DI, two DO, one AI, one AO) and up to nine different signal types. Due to the large number of configurable combinations, it offers a compact solution for applications where only a few complex signals are required — for example, as a complement to the company's CX7000 Embedded PC.

In addition to the digital inputs and outputs, one analog input and one analog output can be configured as a current or voltage signal. The digital inputs with configurable filter times can also be used for 24 V HTL encoders with A/B track including latch and gate function or as an up/down counter with a counting frequency of up to 100 kHz. Two of the digital outputs can be used as a PWM signal that can be modulated in both pulse width and frequency in a range of 20 Hz to 25 kHz. This allows the EL8601-8411 to be used in a flexible manner, eg, in digital/analog, counter/PWM/analog or encoder/PWM/analog configurations.

Beckhoff Automation Pty Ltd
www.beckhoff.com

SHORT-WAVE INFRARED CAMERA

The pco.pixelfly 1.3 SWIR from PCO.Tech is a machine vision camera with an InGaAs image sensor that is IMX990-sensitive in the shortwave infrared, near infrared and visible range of the electromagnetic spectrum. The pco.pixelfly 1.3 SWIR camera is suitable for use in a variety of applications, including waste sorting, smart farming and food processing quality control, pharmaceutical and other product packaging industries.

The camera's small 5 x 5 μm pixels enable the use of small magnification optics in microscopy and a low dark current for longer exposure times. As a result, the pco.pixelfly shows high sensitivity across the entire spectral range with more than 90% in shortwave infrared.

Features include VIS and SWIR sensitivity from 400 to 1700 nm, 1280 x 1024 resolution, long exposure times due to low dark current and a high peak QE of 90%. It measures 7 x 7 x 11.5 cm and uses a USB 3.1 Gen 1 interface.

SciTech Pty Ltd
www.scitech.com.au

VARIABLE-FREQUENCY DRIVES

IDEC VF1A Doesa VFDs are suitable for speed control in variable and constant torque applications ranging from fans and pumps to specialised equipment. The VFD is capable of driving an induction motor (IM) or a PM synchronous motor (PMSM). IMs can be driven in open loop or closed loop, while PMSMs can be driven in open loop only.

The range features a compact form factor in a UL open construction, with nickel- and tin-plated bus bars and conformal coatings for corrosion protection.

Electrical input is nominally rated as three-phase low-voltage 380–480 VAC and the VFDs come in 14 models with a capacity range of up to 139 A. Each VFD is quadruple rated for varying duties — normal or heavy overload, and mild (40°C) or high (50°C) temperatures — so users can minimise the number of models needed to handle a wide range of applications.

Other advanced functionality includes control of mechanical brakes, a built-in braking transistor, regeneration avoidance and low-voltage ride through. Safe torque off (STO) capability means the VFD fulfils functional safety standard requirements while eliminating the need for external circuit breakers.

Logic programming with 55 functions, different calculations and sequences lets designers adapt the VFD to meet special requirements. The VFD also includes seven digital inputs, two analog inputs, three digital outputs and two analog outputs for added control functionality. A standard option port and RS-485 terminals are included, and the VFD accepts removable terminal cards or optional communication cards for integration with PLCs and other devices.

IDEC Australia Pty Ltd

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10 GigE: HIGH SPEED FOR YOUR MACHINE VISION TASK

APPLICATION BENEFITS AND SYSTEM ARCHITECTURE REQUIREMENTS


iStock.com/kynny

With a GigE Vision compliant interface, 10 GigE cameras are easy to integrate and are ideal for high-resolution, high-throughput applications.

Image processing systems have become an integral part of machine control and quality assurance. At the same time, they must confront ever more demanding requirements — primarily driven by new sensor features and host systems with high processing power. Where previously VGA resolutions (640 x 480 pixels) were good enough, present-day applications call at least for HD resolutions (1920 x 1080 pixels). Even sensors with up to 50 MP resolution have become standard. The demand for higher resolution goes together with the need for increased machine speed in 100% final inspections, which requires the camera to deliver higher frame rates.

Both high resolution and high speed have a direct effect on the bandwidth between camera and host system. In such applications, the performance of the entire image processing system is limited by the capacity of GigE Vision. 10 GigE with 1.1 GBps bandwidth is the ideal solution to keep up with increasing requirements and to maintain access to the knowledge and experience made with the established and widely used GigE interface.

10 GigE Vision

The 10 GigE Vision standard allows for the use of high-resolution sensors and very high frame rates in mainstream industrial image processing applications. By increasing the bandwidth by a factor of 10 to 1.1 GBps, the established and common GigE Vision standard remains suitable for the next generation of applications.

Cables

Standard copper cables (Cat 6, Cat 6a and Cat 7) used in 10 Gb connections support up to 100 m length. Cat 6 cables can even be used for up to 55 m length, and longer calls for Cat 6a or Cat 7 cables. Fibre-optic cables enable considerably longer distances and ensure reliable data transmission even in interference-critical environments thanks to their immunity against electrical and electro-magnetic fields. 10 Gb Ethernet also supports Power-over-Ethernet (PoE+) and cuts down on costs for the camera connection. At the same time, it reduces possible system errors due to the reduced number of cables used in the camera connection.

Alternative interface standards

Standards like Camera Link or CoaXPress used to be the conventional approach in applications with very high demands on bandwidth. However, the need for frame grabbers and pre-assembled cables turns them into complex and cost-intensive solutions in terms of purchasing and system integration. This is the reason they are not recommended in mainstream applications. The latest developments such as edge computing operating on small ARM-based boards also cannot be completely used due to the necessary use of frame grabbers.

Compatibility and reliability

10 Gb Ethernet, having been established in large data centres for many years, means mature technology. Many providers offer high-quality tested network components such as switches and adapter

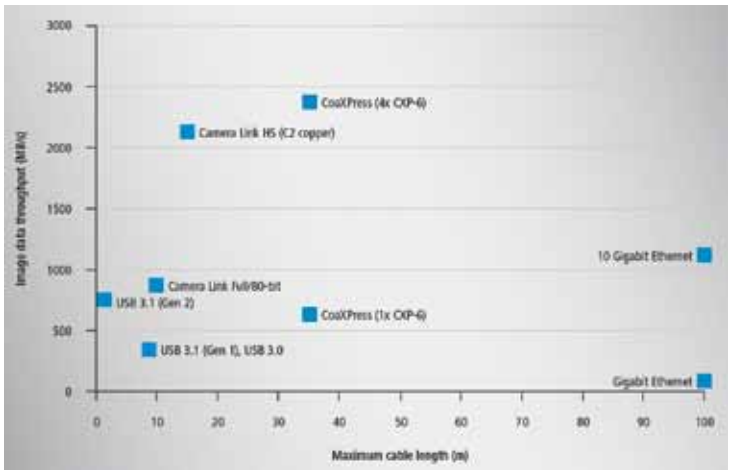

Figure 1: Overview of different interfaces with image data throughput versus maximum cable length.

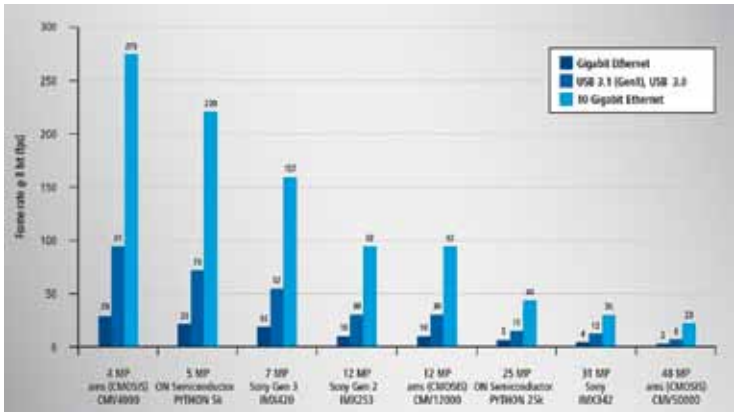

Figure 2: Overview of frame rates for different sensors and interfaces.

cards. Such common products can be directly implemented in the environment of industrial image processing, without the typical drawbacks of being an early adopter.

10 GigE was already described in the GigE Vision 2.0 standard in 2011. The changes from version 1.0 are minimal, so that cameras compliant with the GigE Vision 1.0 standard operate on 10 Gb Ethernet without problems. There is no need to change the application software for camera integration, since it is completely independent from the physical Ethernet interface.

Image processing applications must ensure very reliable and stable operation. Every individual image must be received by the host in order to perform the required inspection task. To ensure this, 10 GigE uses the Packet Resend feature known from the GigE Vision standard, which means the optional repeated sending of lost packets (forward error correction).

Speed and latency

The main benefit of using 10 GigE is certainly higher transmission speed. A 1.1 GBps interface is 10 times faster than GigE Vision and 35% faster than Camera Link Full. In addition to high bandwidth, the latency — the delay between the request from the host and the arrival of the response — has been significantly improved. While latencies between 50 and 125 µs used to be standard in GigE systems, 10 GigE provides latencies ranging from 5 to 50 µs.

IEE1588 PTP

Precise time synchronisation is essential in multi-camera systems and of ever-increasing importance in view of the increasing adoption of Industry 4.0 and the IoT. For this reason, the Precision Time Protocol (IEE1588 PTP) is an integral part of the Ethernet standard and thus also 10 GigE Vision. PTP synchronises various system components to within a few hundred nanoseconds and minimises jitter.

Multicast

Being a network standard, GigE provides some features that are of particular interest at high frame rates. Using Multicast, the Ethernet client can send data packets to several receivers simultaneously. This is an easy way to assign processing power to several host systems (for example, one system to detect image features and another for image archiving or monitoring).

Costs

Right from the start, 10 Gb Ethernet without the need for frame grabbers was intended as a low-cost standard. High-performance standard network adapters with up to four ports are cheap and available from many vendors. Common copper cables are not expensive either and can be easily assembled onsite. Individual cable assembly at the user's site cuts down on system costs and at the same time significantly reduces inventory compared to other interfaces. Additionally, in the event of failure, cables can be immediately and easily exchanged right on the spot.

Another benefit in terms of cost is GenICam compatibility. Widely used in the image processing industry, many individual application requirements for specific scenarios are conveniently met by configuration. In addition, many years of experience allow for reliable estimates in customer-specific software projects and minimise implementation risks.

Reverse and future compatibility

Typically, the maximum transmission bandwidth in Ethernet networks is limited by the slowest network component (eg,

network adapter, switch, router or camera). The same applies to 10 GigE Vision for reasons of reverse compatibility.

To invest in new technologies means to invest in the future. 10 Gb Ethernet is the next Ethernet upgrade and already existing knowledge must remain relevant to support the versions to come. 10 Gb Ethernet came into being in 2010, and since then the Ethernet standard has considerably evolved. Today, 40 Gb Ethernet networks are already operated by data centres throughout the world, and the development of 100 Gb Ethernet is constantly pushed forward. Induced by internet giants such as Google, ever increasing speed under the name Terabit Ethernet is now the subject of present-day discussions.

Host system requirements

High transmission rates and the requirement of 100% image data transmission with 24/7 operation must be taken into account when selecting the host PC. Even short interruptions at the processing host system — for example, caused by parallel or background processes — can result in packet loss, which might result in the loss of images in the worst-case scenario. It is of vital importance that the entire component chain is capable of processing the data stream provided by 10 GigE.

The full 10 GigE bandwidth tested on a system with an i7-7820X processor revealed that about 5% of the overall processing power is required for image reception. This processor is only one possible alternative, but it works well in terms of price–performance ratio, high clock rate and turbo frequency.

The system memory must also be capable of the required bandwidth. The common DDR3-1866 memory module provides a maximum data rate of 14.9 GBps. However, since it is not only image transfer that consumes memory capacity, but also other processes and the operating system itself, the system configuration must always consider the memory bandwidth.

The network card is another factor in the maximum possible system bandwidth. The different bus levels (PCIe gen 1, 2, 3 and 4) together with bandwidths from 1 to 16 lanes can be confusing. Therefore, the slot of the installed network card should operate at least on PCIe gen 3 and should provide four lanes. The slot should be directly connected to the CPU without an intermediate chipset. Usually, the mainboard manual describes the different PCIe slot properties.

Transmission errors are often caused by processes running in the background of the operating system. Bursts of activity by antivirus software and indexing services have a significant effect on the performance of the overall system and must also be taken into consideration.

Summary

Data processing at 10 Gb Ethernet bandwidth is certainly challenging, but not in the implementation of standard network components. A wide choice of manufacturers, low prices and Ethernet flexibility speak positively for the deployment of 10 GigE cameras in high-speed image processing. Present developments for the evolution of even higher speed Ethernet show that the Ethernet standard will meet the future required bandwidths and will ensure reverse compatibility to carry the experience and knowledge of the past into the next generations of machine vision.

Atlantek Vision Pty Ltd
www.atlantek.com.au

WIRELESS MOBILE THERMAL-VISIBLE CAMERA

Teledyne FLIR has released the FLIR ONE Edge Pro, a wireless thermal-visible camera for mobile devices. Unlike previous models, the camera doesn't need to be physically connected to its companion mobile device nor does it have separate models for specific operating systems, providing flexibility for thermal inspections.

The IP54-rated product has a spring-loaded clip to allow operators to attach the camera to many types of mobile phones and tablets. With a combined Bluetooth and Wi-Fi connection, users can operate the camera up to 30 m away from their mobile device, providing the flexibility to effectively inspect hard-to-reach places or for those scenarios requiring greater standoff distances to maintain operator safety.

The product features a 160x120 resolution radiometric Lepton thermal imaging camera paired with a visible camera. Along with VividIR, which combines multiple image frames to deliver one sharper, final image, the cameras are brought together via MSX. The MSX image enhancement feature overlays the edge detail of the visible camera onto the thermal image without sacrificing any thermal data within the image, providing greater context and clarity to improve decision support.

The product also features an extended battery life compared to previous generations of the FLIR ONE and an easily-recognised battery life indicator, making it suitable for more prolonged inspection situations including disaster restoration, home inspection, energy auditing and industrial equipment diagnostics.

Teledyne FLIR
www.flir.com.au

STAINLESS STEEL PANEL PC

The Aplex AEx-916AP is a 15.6″ Intel Skylake IP66 stainless steel panel PC. The system is equipped with a 6th Gen Intel Core i3/i5 processor and supports memory up to 16 GB (DDR4 2133 MHz).

For I/O the product supports two USB 2.0, two M12 8-pin connectors for LAN and an M12 8-pin for VGA, all with waterproof covers, making it suitable for challenging industrial conditions. For storage, the stainless steel PC supports a 2.5″ HDD or SSD space and an mSATA space. It also has expansion slots such as a Mini-PCIe slot to support extended functionality.

The device has a projective capacitive touch display as well as an optional VESA mount, and can survive tough environmental conditions as it has an operating range varying from -20 to 60°C.

Backplane Systems Technology Pty Ltd
www.backplane.com.au

VMWARE-VALIDATED SUBSTATION SERVER

Crystal Group recently announced its first VMware-validated configuration of virtualisation-enabled servers. As part of the Crystal Group Energy Series product line, the CMS-01171 is the company's first iteration of the ES373S17 substation server. This software-agnostic, hyperconverged system is designed to combine real-time automation, remote management, cybersecurity, auto failover and zero-trust security features for utilities as they pursue power grid modernisation efforts.

In collaboration with Intel and VMware, Crystal Group developed its VMware Validated Solution to consolidate the work of multiple discrete hardware solutions into a single, hyperconverged system. Virtualisation greatly reduces the overall substation control footprint and infrastructure requirements while maximising both physical and cyber protections.

Combining Crystal Group's rugged hardware with the VMware Edge Compute Stack is aimed at establishing a rugged, reliable and secure hyperconverged edge platform capable of supporting real-time virtual machines and containers.

Equipped with a VMware Edge Compute Stack and single or dual 3rd Gen Intel Xeon Scalable processors with hardware-enhanced security technologies, this IEC 61850-3-certified server includes critical cyber protections, including data-at-rest encryption, total memory encryption, software guard extensions and software-defined networking. Intrusion detection services and stateful packet inspection firewalls monitor traffic between virtual servers to identify and prevent cyber attacks. In the event of a failed server, VMware Edge Compute Stack automatically migrates the workload of that server over to other servers without disruption.

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NEW PRODUCTS

COMPACT M12 POWER CONNECTORS

The Lapp EPIC POWER M12L connector is designed for uses including cobots and automated guided vehicles (AGVs), while use in I/O modules for Profinet is another common field of application.

To date, 7/8″ connectors have been the standard power interface for the sensor/actuator control cabinet. The change to M12L enables boxes to be reduced in size by over 50%. The PNO has defined the M12 L-coded as the interface for the power supply for all Profinet applications including intelligent motors or I/O modules.

The mechanical L coding of the connector face prevents incorrect plugging with the mating connector. Crimp termination creates a vibration-proof connection, provides maximum contact protection between the contact and cable, and is suitable for automated assembly. When connected and locked, protection class IP65/67 and IP69 can be achieved. The new connector is also available as a 4-pin variant with black insulation and as a 4+FE variant with grey insulation and functional earthing contact (FE).

Also available are other additions in the EPIC POWER M12L series: an EPIC POWER M12L D6 coupling connector, an EPIC POWER M12L G4 panel-mount base, an EPIC POWER M12L F6 cable connector and the EPIC POWER M12L A4 panel-mount base. All variants are also available with solder contacts as an option. There are also EPIC POWER M12L contacts with multiple slots and marking of the conductor cross-section to ensure maximum contact from the plug connection.

Treotham Automation Pty Ltd
www.treotham.com.au

PoE ETHERNET I/O MODULE WITH COUNTER INPUTS

The ICP DAS PET-7284 is a PoE Ethernet I/O module with 32-bit high-speed counter/frequency/encoder inputs and a 4-channel digital output module.

The product offers a variety of input mode options, including Up Counter, Frequency Input, Up/Down Counter, Direct/Pulse Counter and A/B Phase Counter. The modes can be individually configured for all eight channels, where, for example, some channels can be set to Up Counter mode and other channels can be individually set to Frequency, Up/Down Counter or Encoder input mode. The built-in programmable low pass filter can be used to eliminate noise where the width of the high/low pulse is narrower than the minimum high/low width of the low pass filter.

The module is equipped with FRAM memory to retain the counter values. FRAM is a type of non-volatile memory that can be used to store written data, even after the module has been powered off. This storage feature can be either enabled or disabled, and the data can be retained for up to 10 years.

It also has a 2-port Ethernet switch for daisy-chain topologies and a built-in web HMI, as well as support for both Modbus TCP and Modbus UDP protocols.

ICP Electronics Australia Pty Ltd
www.icp-australia.com.au

EMBEDDED BOX PC

Interworld Electronics has announced the AVS-520 from Aplex Technology, purpose built for factory automation and machine vision applications. With two LAN ports, four USB 3.2 Gen 1 ports and two serial ports, it can be connected to a range of cameras and sensors. Where additional control is required, the AVS-520QL, with its additional two GbE LAN ports, two USB 3.0 ports and its 8-bit digital I/O can also control connected systems based on digital inputs. Having a VGA port and HDMI for dual display output, this controller can easily serve as the hub of an effective HMI solution.

The AVS-520 has two removable 2.5″ drive bays allowing it to easily transfer large amounts of data storage. It also has one full-size Mini-PCIe slot and a 2242/2280 M.2 slot B/M keyed that supports NVMe and supports up to 64 GB of SO-DIMM DDR RAM.

The AVS-520 is a rugged, fanless system that features a tough casing and an operational temperature range of -20 to +60°C for the i3/i5 processors or -20 to +50°C for the i7 processor. It can withstand power surges and drops, and has a DC input range of 9–36 VDC. The system is also resistant to high levels of shock (15g) and vibrations (1g).

The wall mount or DIN rail mount options, and having all ports on the front face, make the AVS-520 adaptable to suit a variety of needs.

Interworld Electronics and Computer Industries
www.ieci.com.au

BIOTECH MASS FLOW CONTROLLERS

Brooks Instrument has announced three certifications are available for its SLA Series and SLA Series Biotech mass flow controllers (MFCs) and meters.

The certifications, which cover Elastomer Cure Date/Shelf Life (Declaration of Compliance 2.1), KHK Certification for Japan and Surface Roughness, help users address emerging safety, legal and regulatory requirements for materials used in bioprocessing, chemical and petrochemical operations.

Certain regulatory and safety requirements call for certification and documentation of calibration protocols or other declarations about the materials of construction in the wetted path of the MFC.

The Elastomer Cure Date/Shelf Life (Declaration of Compliance 2.1) lists the cure dates and shelf life of the elastomers used in the assembly, indicating that the elastomeric material has complete lot traceability and optimum physical properties for a given application.

KHK Certification is often required on MFCs purchased by global OEMs selling critical systems into Japan or for end users in Japan. These systems are primarily used in petrochemical catalyst research markets; however, semiconductor manufacturing and power generation can also have these requirements.

Surface Roughness certifications relate to the average surface roughness (surface finish) of the MFC flow path.

Brooks Instrument recently developed special biotech options for both its SLA5800 Series MFCs and its hose-down/wash-down suitable SLAMf Series thermal MFCs. Available biotech-specific documentation includes certifications for USP, FDA and ADI-free O-rings and valve seats; 2.1 certification for materials of construction (wetted path); plus National Institute of Standards and Technology/ICC gas-specific calibration certification for traceability.

Measurement Plus Pty Ltd
www.measurement-plus.com.au

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www.turck.com.au
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COMPRESSOR

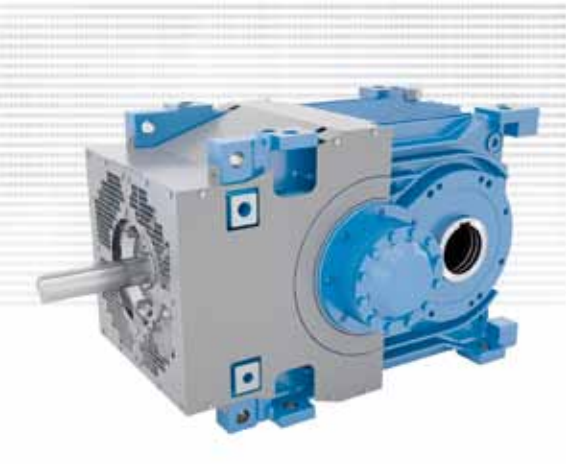
Compressor manufacturer Boge has expanded the fourth generation of its S series with a 75 kW compressor that has had its energy consumption reduced by over 12% compared with its predecessor, while the free air delivery has increased by almost 9%. Generously sized components reduce internal pressure losses and, with a footprint of 1.2 x 2 m, the housing of the latest model is considerably smaller than its older siblings. The compressor also comes with high-performance, low-energy IE4 motors and permanent magnet motors fitted as standard.

The vertical oil separation concept enables low residual oil content, minimal pressure losses and a long service life. The internal cartridge is quick and easy to remove and replace. Maintenance takes place from two sides with just a few simple movements — the intake filter is accessible and both the oil and air coolers can easily be removed and cleaned.

In situations where temperatures can exceed 40°C, Boge also has a high-temperature design which offers improved cooling.

Boge Compressors Ltd
www.boge.net.au

DRIVES FOR BELT CONVEYOR SYSTEMS



The MAXXDRIVE XT industrial gear unit from Nord Drivesystems provides output torques of 15 to 75 kNm with speed ratios from 6.3 to 22.4 and is offered in seven sizes for powers from 22 to 2100 kW.

The power and speed ranges of the two-stage right-angle gear unit have been specially designed for industries in which low speed ranges are required in combination with high powers, such as the bulk goods and mineral industries. Its robust design makes the MAXXDRIVE XT resistant to dirt and is said to be reliable in rough operating conditions. A special sealing concept reduces maintenance, while large roller bearings and centre distances increase the load capacity and service life of the components.

As standard, the industrial gear unit is equipped with a heavily ribbed UNICASE housing and an integrated axial fan. Due to the increased surface and the airflow covers, the cooling airflow is optimised and a high thermal limiting power is achieved. In many cases, additional cooling is not required.

NORD Drivesystems (Aust) Pty Ltd
www.nord.com

OIL TEMPERATURE CONTROL UNIT

The technotrans teco ct 130 base 60, oil-based temperature control unit is a compact solution with high power density for a temperature range of up to 130°C, and is aimed at users in the plastics processing industry as well as in the rubber and high pressure die casting industry.

The baseline variant of the teco ct 130 is suitable for a temperature range up to 130°C with a recirculation rate of up to 60 l/min. The unit has a heating capacity of 6 kW. Due to the integrated 'longlife' stainless steel heating cartridge, the heat is transferred in a loss-free manner. Multi-voltage variants from 400 to 460 V as well as dual-frequency versions for use in 50 Hz and 60 Hz networks are also available. A large heat exchanger surface provides a cooling capacity of up to 30 kW.

The solution has a basicControl microcontroller and a membrane keypad with a seven-segment display. The hinged control cabinet front provides access to the electrical components. The interface port on the front of the unit is also adaptable, eg, by integrating analog, serial or Ethernet-based interfaces.

technotrans technologies pte ltd
https://www.technotrans.com

AMRs increase efficiency and improve ergonomics at DENSO

Like most manufacturers, automotive parts maker DENSO is always looking for ways to increase efficiency and productivity. Research showed that DENSO workers were walking up to 19 km per day moving material between production and the warehouse, spending about 60% of their time pushing carts, so a more efficient process was required.

"We knew we had a lot of people that were getting paid to move parts all day long, walking carts from one place to the other," said TIE Engineer Travis Olinger. "But if we have people that are only conveying parts, then that's a non-value-added activity, and we had plenty of open jobs for value-added activities within the production environment.

"We wanted to pay people to make parts for us that make us money, and not pay them to move parts that cost us money."

The engineering team knew that the cost and lack of flexibility of automated guided vehicles (AGVs) couldn't address the company's dynamic environment that would require regular route changes. Additional challenges included narrow aisles for manoeuvring and heavy metal parts to be transported. In the end the team settled on MiR autonomous mobile robots (AMRs).

The MiR250 had recently been introduced, and the team was attracted to its 2 m/s speed, the payload of 250 kg to handle heavy metal parts and the ability to navigate narrow spaces. Standardising on the MiR250 shelf-lifter and ROEQ carts also allowed DENSO to expand into other areas using the same cart base and customising it for each use.

The MiR robots brought significant advantages in flexibility, safety and user-friendliness, and met other DENSO requirements as well.

"MiR stood out from the ability to use REST API calls, the intuitive nature of the fleet, the ease of mapping, ease of mission creation, ease of changing locations," Olinger said. "It was just extremely intuitive compared to the other platforms that we looked at."

Working with MiR partner Advanced Control Solutions (ACS), DENSO was able to develop an information flow using the REST API to support on-time deliveries, manage charging and proximity cues to prioritise missions, and allow associates on the floor to call for the robots. DENSO has also integrated the robot to automatically open the door in and out of a cleanroom area, using the MiR I/O modules to send wireless signals to the roll-up door controller.

"MiR was prepared to support us, as Denso North America, from the numbers we were going to roll out," Olinger said. "We looked at some companies that just didn't have that same support structure, and didn't have that history, and we didn't think that they could keep up.

"The information sharing has been huge. It's not just a vendor that we've bought something from: they have grown with us, they have become a partner and they are instrumental in how we are now expanding."

MiR provided a week of onsite MiR Academy training, including for DENSO employees who could be groomed into super-user roles to support the project long term. MiR has also assigned a DENSO North America-specific contact, has created a group for DENSO on the MiR community site and conducts monthly meetings with DENSO.

With support from MiR and ACS to ensure a smooth rollout, DENSO achieved initial set-up in a day and the robots were deployed to production after about a week of testing. After that, DENSO engineers were able to manage most new deployments independently.

DENSO's ROI plans for projects are typically less than two years, but the indirect cost reduction from the MiR robots replacing conveyance achieved ROI in a year or less. Within six months of project launch, DENSO was able to cover all lines in the ignition plant with MiR robots and redeploy six workers to add greater value to the company. DENSO has also seen improvements in employee morale and ergonomics, as well as overall efficiency gains and a change in company culture with an automation mindset focused on streamlined processes. This represents a major change in how the engineering team designs production lines, with how components are delivered line-side as a primary consideration right out of the gate, not something that is considered later.

Konica Minolta Business Solutions Australia Pty Ltd
www.konicaminolta.com.au

AS I SEE IT

WHY INNOVATION IS THE KEY TO MANUFACTURING SUCCESS

One of the few positives to have come out of the COVID-19 pandemic is a frank and open discussion about manufacturing in Australia. Serious questions have been raised about our heavy reliance on goods produced overseas, especially considering the crippling effects on our economy when global suppliers are unable to deliver, like when supply chains are disrupted.

Many of the goods we import can be made locally. We already have many natural resources, so why don't we make more here?

Few would argue the merits of domestic manufacturing to secure national supply. Local production makes us far less vulnerable to overseas factors that we have little to no control over. Moreover, a vibrant manufacturing sector will drive our economy and ensure interesting and well-paid jobs are retained here instead of disappearing overseas.

While the economic advantages of local manufacturing may be self-evident, the question has always been how to compete effectively against fierce global competition.

In the past, goods have tended to be sourced from wherever they can be produced for the lowest price. This usually meant going abroad, as our comparatively high labour rates made many locally produced goods less cost-effective. The cost of labour is generally seen as the single biggest hurdle for local producers, although our isolation and comparatively small domestic market are also factors.

However, there is a mood for change in the general community with many Australians now prepared to accept paying slightly more for locally manufactured goods.

The key for creating a robust local manufacturing sector is to be innovative in what we do. Innovation means 'thinking outside the square' and inventing better, more advanced products. Such products create value through know-how, are less sensitive to price pressures and give local producers the edge over overseas-based competition.

But innovation also needs to be applied to the manufacturing process. Modern automation techniques, such as artificial intelligence and robotics, need to be utilised as much as possible. Automation reduces the manpower required and increases both the quality and quantity of output. Suppliers of automation equipment offer a plethora of products that can provide the impetus for innovative manufacturing; some of the latest ideas include smart, edge-based controllers and cloud-based engineering services.

Innovation will at times mean trialling different ideas and taking some calculated risks. Some government support and academic assistance may be needed along the way, but while the changes required may be challenging and uncomfortable for some, the rewards will be there for those who venture out.

Examples abound of businesses using innovation to take on tough markets and still come out on top. Dyson's cyclonic vacuum cleaners provided better filtration and thereby revolutionised that market — virtually every vacuum cleaner is now bagless.

Tesla took on the international car market, dominated by some of the world's biggest multinationals with massive R&D budgets. Yet they were able to make substantial headway in just a few years with a highly innovative product and some very smart manufacturing techniques.

Australian manufacturers will have a bright, sustainable future, with strong employment prospects, if we can learn to apply innovation to what we do.

Harry Mulder is the principal automation engineer at Beckhoff Automation. He's been involved in industrial automation for over 30 years and is fascinated by how new innovations keep affecting the direction of the industry. He really enjoys the practical element of his job, where he has a chance to get his hands dirty!

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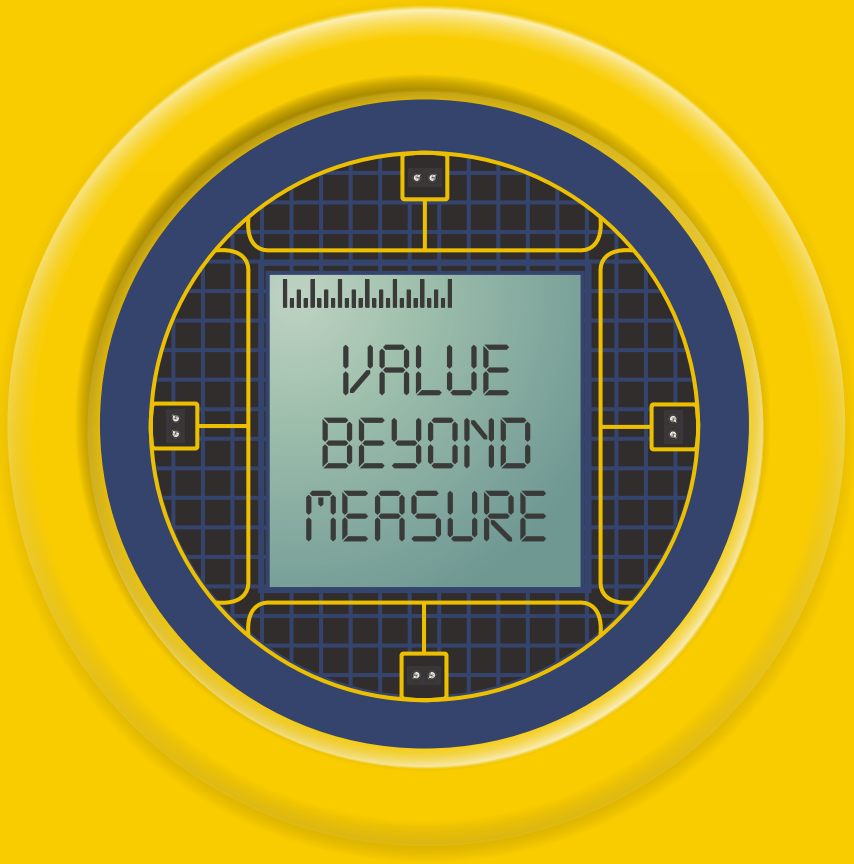

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