PROCESS TECHNOLOGY

AUTOMATION + CONTROL + INSTRUMENTATION

August 2020 vol.34 no.3

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New vision system uses AI to detect defects

OMRON

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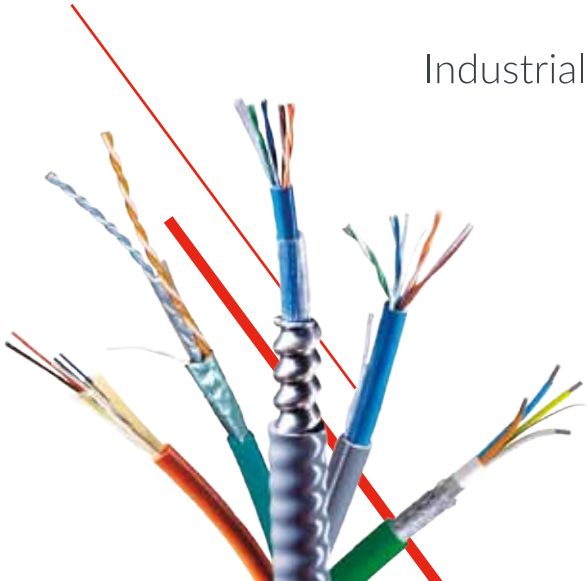

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CONTENTS

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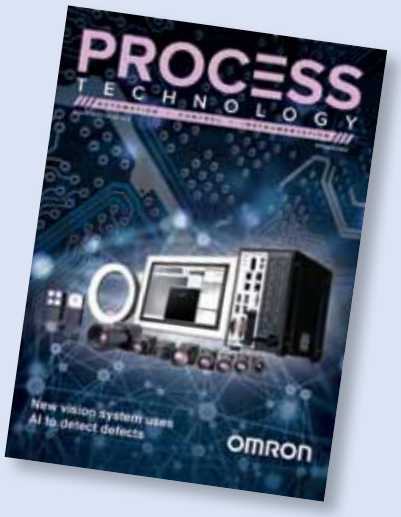


Omron has released its latest FH Series vision system with defect detection AI technology that identifies subtle defects with 'human-like' sensitivity.

With a shortage of skilled inspectors and rising labour costs, manufacturers are facing intense pressure to automate processes that rely on the senses of experienced human workers. For many industry sectors, particularly food and beverage, it is vital to reliably identify subtle defects, especially on flexible lines producing a wide range of items. AI technology reproduces the techniques of skilled inspectors to reliably detect defects that were once difficult to capture, automating human-like visual inspection. It's a new feature that works in synergy with the existing inspection functions. This technology is vital in today's rapidly changing working environment. With the on-going global COVID-19 pandemic, employees must now avoid working on manufacturing sites, to avoid contamination and infection. The demand for labour-saving automated visual inspection has never been greater.

The new FH Series Vision System with AI maximises inspection capability. Scratches and blemishes that were once difficult to capture can now be identified even without the use of samples or adjustment.

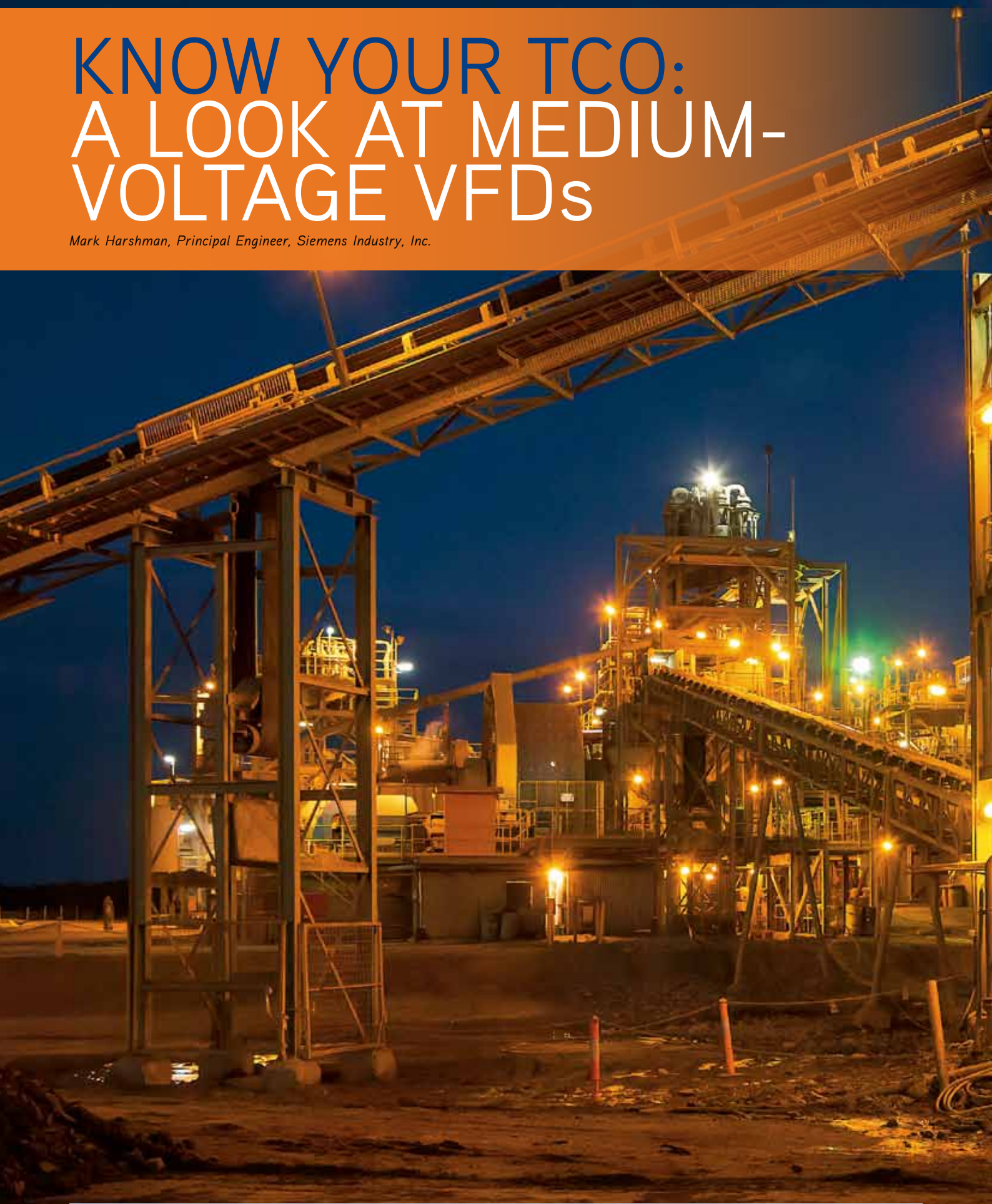
And no dedicated AI engineer is required for setup and adjustment at manufacturing sites.

Omron's FH Series vision system with AI frees employees from repetitive and monotonous work so they can become engaged in more creative work to help reduce costs and boost productivity

Omron Electronics Pty Ltd
www.omron.com.au

KNOW YOUR TCO: A LOOK AT MEDIUM-VOLTAGE VFDs

Mark Harshman, Principal Engineer, Siemens Industry, Inc.



Medium-voltage VFDs from suppliers with a long history of operating experience with various drive technologies and topologies exhibit a lower TCO.

Medium-voltage variable frequency drives (VFDs) are long-lived assets that play a critical role in many industrial manufacturing facilities, making total cost of ownership (TCO) a key factor in purchasing decisions. Medium-voltage VFDs are typically rated between 2.3 and 13.8 kV, and deliver power ranging from 150 kW to 120 MW at motor speeds from 10 to 15,000 rpm.

Automation and related components with shorter lives and less critical roles will generally have a TCO that's very closely related to the initial purchase price. But initial purchase price is only one of many factors contributing to the TCO for medium-voltage VFDs.

Table 1 lists the main TCO factors and shows that price is only one of its many components. And in many applications, price isn't the most important factor, as shown by a recent survey conducted by Tritech Marketing Inc., a leading market research firm. The survey shows that purchasers of medium-voltage VFDs select a particular manufacturer and product by giving weight to a number of factors as shown in Figure 1.

These factors are listed below in order of importance as determined by adding the percentage of respondents who ranked each factor as either critical or important:

1. Reliability: 97%
2. Customer service and support: 92%
3. Size of drive: 88%
4. Speed of delivery: 88%
5. Price: 86%
6. Ability to withstand harsh environments: 85%
7. Manufacturer's reputation: 81%
8. Range of available options: 74%

A key factor not listed in the survey is longevity of the VFD, with a longer lifespan contributing to lower TCO in an indirect but important fashion.

All survey respondents use or specify medium-voltage VFDs, and the industries surveyed included:

- Mining
- Oil and gas
- Chemical/petrochemical
- Water/wastewater
- Pulp and paper
- Engineering, procurement and construction

Explaining TCO

Medium-voltage VFDs are a class of equipment with very long lifecycles, typically measured in decades. It is not uncommon for a drive to last for the entire life of a particular application with appropriate maintenance, yet this important fact is often ignored in the purchasing stage.

Purchasing personnel are often enticed by the lowest initial price for the purchased capital equipment. This means that the purchasing agent is swayed against considering TCO.

In reality, TCO is critical to the optimisation of the performance for this type of asset. This fact is realised by plant operations and maintenance personnel, particularly the plant manager, as they are responsible for keeping the plant up and running in an efficient manner with maximum performance. Operations and maintenance personnel should therefore be given substantial input into purchase decisions for large capital items like medium-voltage VFDs that are critical to plant performance and uptime.

Medium Voltage VFD Total Cost of Ownership Components
1. Reliability
2. Downtime
3. Required maintenance
4. Customer service and support
5. Manufacturer's reputation
6. Spare parts acquisition and stocking
7. Efficiency
8. Price

Table 1: Total cost of ownership components.

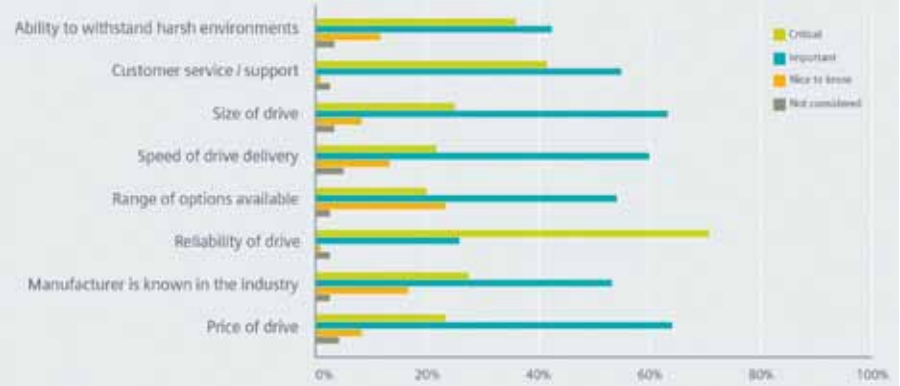


Figure 1: Leading factors considered by purchasers when selecting medium-voltage VFDs.

TCO is calculated by determining the net present value (NPV) of all the costs and savings that result from the purchase, installation and operation of a particular asset for the duration of its useful life. Some of the leading factors in any TCO calculation include price, operating costs and reliability.

NPV normalises all of the costs and savings to the present. The purchase price is a present value, but any future costs and savings must be discounted to correctly calculate their present value, as a dollar saved 10 years from now is worth much less than a dollar saved today.

For short-lived assets with low operating costs that play a non-critical role in a manufacturing process, the TCO will be very close to the price. But for long-lived items like a medium-voltage VFD with significant operating costs and a key role in a customer's process, it's extremely important to calculate TCO, as lower-priced items often have a higher TCO than a higher-priced alternative.

For example, consumers buy a short-lived asset (eg, motor oil for a car) based chiefly on price, but they strongly consider factors such as reliability, service and operating costs when buying a car — implicitly, if not explicitly, comparing the TCO among prospective vehicles prior to purchase.

All industrial purchasers will take TCO into account to some degree when buying a large capital item with an expected long service life such as a medium-voltage VFD. Purchasers will calculate TCO in different ways with widely varying levels of precision, but the basic TCO concepts will hold true in all instances.

When calculating TCO, the initial price is the easiest variable to quantify, and thus it often gets the most attention. But other variables can be just as important, albeit more difficult to estimate at purchase time as they are projected future values.

For example, greater reliability leads to less downtime and lower maintenance costs, two critical factors in many medium-voltage VFD applications that can be difficult to put into exact numerical terms. So, most purchasers simply include estimated numbers for TCO factors other than price, and then discount these numbers to the present based on some internal corporate financial metric.

The first factors to be considered are reliability, downtime and required maintenance — three closely related elements that work together to have a substantial effect on TCO.

Reliability, downtime and maintenance

It isn't an accident that market surveys have reported reliability as the most important factor in selecting a drive supplier. Reliability is even more important once all the costs of a drive failure are taken into account.

For example, using a crude TCO calculation, the cost of replacement for a medium-voltage VFD might be just the purchase cost of the replacement drive. But this doesn't consider the engineering that may be required to make a newer model fit physically, or the re-wiring necessary to reconnect the newer model. It also doesn't include the cost of the installation.

But most importantly, it doesn't include the cost of downtime itself. Downtime costs are usually much greater than even the fully burdened cost of replacing the drive. Unplanned downtime is especially devastating and costly.

Therefore, a sophisticated and more accurate TCO calculation would take downtime costs into account, giving much greater weight to drive reliability. Suppliers with a known reputation for reliability are often priced higher than suppliers with newer products that have yet to be thoroughly tested by years or decades of operation. But what creates high reliability in a medium-voltage VFD?

Drive innovations improve reliability

Some suppliers use an integrated design that results in a drive with a smaller footprint and simplified design. A traditional drive would have up to five separate components: harmonic filter, power factor correction components, transformer, power converter and motor output filter (Figure 2).

An integrated design drive, however, would have only three components: the drive, an isolation transformer and a power converter. To achieve an integrated design, the drive itself must have very high performance, which negates the need for some of the additional components needed with a non-integrated design. The simplicity of an integrated design results in a more straightforward system with fewer components, thereby increasing reliability and reducing downtime.

Specifically, an integrated design allows the entire drive system to be thoroughly factory tested and then shipped to the site, as opposed to other designs that are often not tested as a system until all components arrive onsite and are interconnected. Thorough testing of the entire drive system for an extended period of time at the factory increases initial reliability by a substantial factor, and is also a contributing factor to better medium- and long-term reliability.

Another innovation that increases reliability is the use of a series of low-voltage cells ganged together in a building block approach to create the medium-voltage power output required by the drive. If a drive employs this building-block approach,

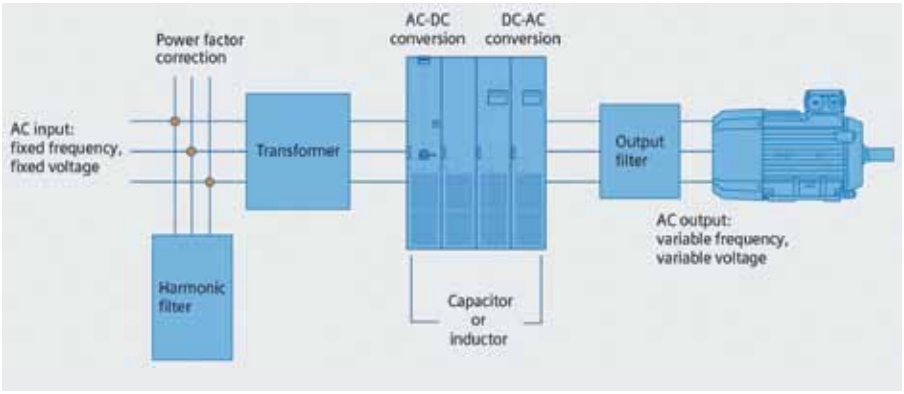


Figure 2: A traditional drive has five separate components.

> TCO IS CALCULATED BY DETERMINING THE NET PRESENT VALUE (NPV) OF ALL THE COSTS AND SAVINGS THAT RESULT FROM THE PURCHASE, INSTALLATION AND OPERATION OF A PARTICULAR ASSET ...

then it's possible to quickly bypass a failed cell while the drive continues to operate.

A third design feature that improves reliability is fault tolerance, which keeps a drive running in the event of a non-critical fault. This strategy ensures that the drive never trips on a single drive fault, and waits for a second condition to confirm that a problem exists. This fault tolerance strategy can also provide a hierarchical series of warnings of drive or component failure.

Fault tolerance gives an operator significant time to review the situation and avoid a system shutdown. Because of their ability to stay online in the event of a non-critical fault, drives with fault tolerance have been used in many critical industry applications in process plants and other facilities, including refineries, power plants, and water and wastewater systems.

It stands to reason that a medium-voltage VFD with a higher reliability will also have less required maintenance, further contributing to a lower TCO.

Service and longevity

Major suppliers generally have a worldwide network of application engineers and service centres. Some of these suppliers have better support in some regions than others — a factor that should be evaluated by purchasers, as faster local support can reduce downtime and contribute to a lower TCO.

Another important customer service factor to consider is the upfront assistance available when selecting the particular type of VFD best suited for an application. Suppliers that offer many different types of drive topologies can use this experience to apply the right topology for each situation, resulting in the best fit.

Medium-voltage VFDs that use designs with long operating histories also have proven longevity. Medium-voltage VFDs will have a published specification that indicates a design life expectancy, generally stretching to 20 years. Some suppliers will support discontinued product families for up to 10 years after the products are out of production.

A supplier that's able to extend its design life expectancies in this manner can do so because it has a huge database of applications compiled from decades of medium-voltage VFD manufacturing and support.

Drive size, options and delivery speed

Suppliers that offer a wide range of medium-voltage VFD sizes and options are more attractive to purchasers because they allow use of the same supplier across many applications. This reduces costs when multiple drives of different sizes are required, particularly if the drives will be installed and operated at a single facility.

Purchasing administration efforts are reduced, as it's only necessary to deal with a single supplier. Fewer parts need to be held in stock by the purchaser, and operations and maintenance personnel are able to diagnose problems and make repairs quicker as they only need to become familiar with one supplier's drives and associated control systems.

Accurate accounting would determine the lower costs realised by using one supplier for a certain quantity of drives, and then allocate these savings to each drive TCO calculation.

The greater the range of sizes and available options, the more optimisation can occur to fit the drive to the particular application. Optimising the drive for the application results in savings due to greater efficiencies and improved operation — factors that reduce TCO, although in a manner that can be hard to quantify.

In terms of speed of delivery, two factors come into play: stated delivery time and time required for installation and commissioning. The stated delivery time is quoted by the supplier, but the time for installation and commissioning is usually not.

A key factor that cuts installation and commissioning time is integrated design of the medium-voltage VFD. Commissioning time is less, and some suppliers estimate that drive systems with an integrated design can be commissioned in as few as three to 10 days, depending on drive size and system complexity. This reduces the time required to commission a drive system that doesn't employ an integrated design by at least 25% and can be as high as a 50% commission time reduction.

Although speed of delivery and commissioning does not directly contribute to TCO, it stands to reason that faster installation times will result in more time-efficient production and a higher cost savings associated with using the drive.

Conclusion

Medium-voltage VFDs are long-lived assets with significant operating costs that are often used in critical industrial manufacturing applications, making it necessary to look at the TCO of a drive, as opposed to just its initial purchase price.

In fact, a drive with a low initial purchase price will often have very high costs in terms of other key TCO factors. To make the best purchase decision, buyers should calculate the TCO for a medium-voltage VFD by considering reliability and associated downtime, drive innovations, a manufacturer's reputation and customer service, and then select the drive with the lowest TCO.

Siemens Ltd
www.siemens.com.au

HOT PRODUCTS
ON WWW.PROCESSONLINE.COM.AU THIS MONTH

EDGE AI PLATFORM

The Neousys Nuvo-8240GC is an industrial-grade Edge AI platform supporting dual NVIDIA Tesla T4 Inference Accelerators.

Backplane Systems Technology Pty Ltd

https://bit.ly/3gotsvG

PORTABLE HCDP TESTER

The CDP301 portable HCDP tester uses the chilled-mirror principle for both hydrocarbon and water dew-point measurements.

AMS Instrumentation & Calibration Pty Ltd

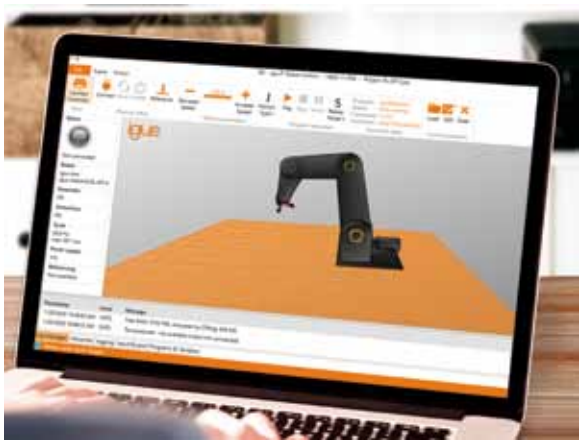
https://bit.ly/2Pl9BBw

SERVO DRIVE

The Fatek Automation SD3 series servo drive is a an AC servo system with advanced functions that supports various motors from 50 W through to 2 kW.

Global Automation Asia-Pacific

https://bit.ly/3k6LXXO



ROBOT CONTROL SOFTWARE

To enable easier robot programming, igus has developed control software for its low-cost automation solutions.

Treotham Automation Pty Ltd

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Valve upgrades increase efficiency at power station

SSE's Great Island Power Station in County Wexford is a 464 MW combined cycle gas turbine (CCGT) plant which was first commissioned in 2014. Acknowledged as one of Ireland's cleanest and most efficient natural gas power stations on the country's national grid, the plant generates enough energy to power the equivalent of half a million homes.

In 2016 the operators identified improvements that could be made in the heat recovery steam generator (HRSG) plant to improve efficiency and long-term asset management. The improvements involved the introduction of master/martyr valve sets on the high-, intermediate- and low-pressure turbine drain valves.

Master/martyr valves are two valves installed in series on the same pipeline. The master valve sits upstream of the martyr valve and is only operated when the martyr valve is shut. This ensures that the master valve never has to cope with any differential pressure when operating, giving it a greatly extended lifespan. The martyr valve always opens and closes under pressure and will therefore require maintenance at some point. When this happens, the closed master valve enables maintenance to be performed easily and with minimum interruption to routine operations. The actuators controlling these valves are equipped with interlocks to ensure that the valves only operate in the correct sequence.

The upgrade, involving the replacement of existing valves, installation of new valves, installation and commissioning of a total of 30 new actuators and integration with the existing control system, was programmed to take place during a three-week outage period. Rotork Site Services was awarded a turnkey contract to carry out all the work within this challenging timescale.

Rotork Site Services responsibilities encompassed the system design, product selection and procurement; design of the control system and integration with existing Mitsubishi PLC; installation of power, control and instrumentation cabling and cable containment; commissioning and site training; and project management.

Plant upgrades were performed in 30 areas comprising six continuous blowdown valves, six intermediate blowdown valves and 18 turbine drain valves. Valve adaption was designed and fabricated for the installation of 30 Rotork IQ non-intrusive intelligent electric valve actuators. These were specified with local plug-and-socket assemblies to facilitate removal and replacement if overhauls are required in future outages.

Rotork double-sealed and non-intrusive actuators are designed to withstand hazardous and environmentally challenging operating conditions often encountered in the power generation industry. Secure, non-intrusive set-up and data transfer eliminates the need to remove electrical covers for commissioning once the actuator is site wired. This feature permanently protects internal components from the time the new actuator leaves the factory, enhancing the long-term reliability of the double-sealed enclosure design. In addition, IQ intelligent actuation technology incorporates data-logging abilities, enabling operating data to be downloaded and diagnosed for the optimisation of plant performance, preventative maintenance and asset management.

The project was successfully completed on time and to the satisfaction of the SSE engineers. Rotork is also offering a comprehensive Lifetime Management program to support over 100 Rotork products on the site and further enhance the reliability and availability of the actuation assets.

"We always knew that this would be a tight program, but we submitted our full technical proposal within a few days of our initial site survey, which gave SSE the confidence to award the contract as a full turnkey project," said Rotork's UK Site Services Manager. "Our project and engineering teams worked to exacting timescales and liaised seamlessly with site engineers, suppliers and Rotork production departments to ensure that completion within the timescale was achieved. A very pleasing outcome for all parties."

"We have worked closely with Rotork for many years, utilising them at many of our plants in the UK," said Padraig Dunleavy, Great Island CCGT Station Manager. "We are fully aware of their capabilities for meeting strict deadlines on major plant upgrades such as the one proposed for Great Island.

"Rotork were very professional and gave us full confidence for the timely outcome of the project, from the initial site survey through project management, installation and system integration. This confidence is reinforced by the long history of reliability demonstrated by the Rotork actuators installed on SSE sites."

Rotork Australia
www.rotork.com

PNEUMATIC ROTARY ACTUATOR

The Bürkert Type 2053 is a stainless steel pneumatic rotary actuator that can be combined with common ball and butterfly valves as well as with Bürkert ELEMENT Tops.

The interface on the valve is designed according to ISO 5211, and the single-acting actuators are returned to the initial position by spring force, while double-acting actuators are returned by compressed air. The welded construction of the stainless steel housing is intended to ensure the actuator is 100% maintenance-free.

The actuator is available in three different sizes: P0, P1 and P2. All three sizes have a high closing torque despite their compact design, while the air consumption per stroke cycle is low due to the low cylinder volume, offering energy saving potential.

The actuator is recommended for space-critical applications where users prefer a pneumatic actuator that is cylindrical and slim at the top.

Burkert Fluid Control Systems
www.burkert.com.au

HMI WITH INTEGRATED SUPPORT ARM

The SPC-800 series from Advantech are arm-mounted human–machine interfaces. Featuring an integrated support arm system mount adapter and a customisable extension unit, these devices are designed to facilitate diverse visualisation and control applications.

With IP66-rated ingress protection and IEC 61131-2/61010 certification, the SPC-800 HMIs are robust and suitable for operation in a wide range of industrial environments. The extension unit supports several peripherals and controls such as an RFID reader, key-operated selector switches, LED indicators, pushbuttons and emergency stop buttons. The integrated mount adapter supports both pendant and pedestal mounting to enable optimal positioning and ergonomic control. Available in a 15″ or 21″ form factor, the SPC-800 series are ultra-slim (25-mm wide front bezel), lightweight and have a snap-fit design that allows for single-person installation, ensuring easy deployment.

The support arm mount adapter allows the system to be deployed outside the control cabinet. Cables are routed through the swing arm to an I/O wiring area that can be accessed without dismounting the device. This not only ensures easy access to the power supply, Ethernet and USB ports, but also enables the use of standard connectors. The integrated mount adapter supports both CP 40 (Rittal) and CS-480 (Bernstein) suspension systems for pendant and pedestal mounting to enable optimal positioning and ergonomic control.

Advantech Australia Pty Ltd
www.advantech.net.au

NEW PRODUCTS

CELLULAR IoT GATEWAY

The HYDAC 4G TTConnect Wave IoT gateway and associated cloud platform is designed to offer a complete, end-to-end, out-of-the-box solution that connects assets to the cloud. This subscription-based service is available with different service packages.

The Wave IoT Gateway collects data from a CAN network and sends the data to the cloud via the mobile network. The online portal platform allows the user to monitor and manage each installation in a fleet-like manner. It captures the minimum, maximum or average value over the specified update time and sends the data to the cloud. The timeframe and type of data sent can be modified on the cloud platform.

The Wave can perform data buffering, so that in the event of no mobile network coverage, the Wave will store timestamped data in the onboard the flash memory (4 GB). When the connection is re-established, it will send the data to the cloud via the mobile interface. It also has a Wi-Fi interface that provides a hot spot capability or can be used to connect to an existing Wi-Fi network.

Data and asset security are essential, and the Wave is supplied with built-in security measures including SSL encryption between the gateway and the cloud, a private APN and a built-in firewall.

The TTConnect Wave IoT gateway hardware is certified for use in Australia and New Zealand with the appropriate approvals and certification. The unit is also certified for use in Europe, Asia and the Americas.

HYDAC International
www.hydac.com.au

LIGHT INDUSTRIAL PANEL PCs

The iEi AFL3-W10A/W12A/W15A-AL Series is a range of quad-core Intel Celeron processor-powered flat bezel panel PCs with a wide variety of functions and peripherals. The IP64 flat-bezel design is suitable for easy and simplified integration into various applications.

The Intel Celeron J3455 is a system-on-chip that ensures optimal memory, graphics and peripheral I/O support. It is equipped with 4 GB of DDR3L SO-DIMM memory for smooth data throughput with reduced bottlenecks and fast system access.

Two serial ports, two external USB 3.1 Gen 1 ports and two external USB 2.0 ports offer simplified connectivity to a variety of external peripheral devices. Wi-Fi capabilities and two RJ-45 Ethernet connectors provide the system with connection to an external LAN. Moreover, one of the Ethernet connectors is capable of supporting PoE by installing an optional PoE module.

The antiglare touchscreen size is 10.1″, 12.1″ or 15.6″, while power input is 9–30 VDC with a lockable DC jack.

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

MULTI-CHANNEL CONTROLLER

The LQ800 Multi Channel Controller from Electro-Chemical Devices (ECD) combines IoT liquid analytical measurement of more than 50 parameters and process control of flow and level for a wide range of water-based industrial applications.

The controller is designed to operate with up to eight digital analytical and flow/level process sensors. Analytical measurements available include pH, ORP, conductivity, resistivity, dissolved oxygen, selective ion, turbidity, flow and level in varying configurations for a given application.

The LQ800 features built-in analytical calculations and data logging. Easily selectable mathematical functions include automatic measurement conversions for dissociation, cross-sensitivity and concentration levels.

The controller digitally communicates with any of ECD's S80 intelligent sensors: via two-way communication, each plug-and-play S80 sensor automatically configures itself to the LQ800's menus and display screens for the desired measurement parameter, which eliminates complicated technician set-up routines.

The type of S80 sensor, identity and serial number are stored in the sensor's memory along with calibration registers. Sensors are calibrated at the factory so they are ready to use when connected, are waterproof and submersible with all internal components epoxy encapsulated inside the housing and have various optional process fittings and configurations.

The LQ800 also features a large, easily viewed, colour, 120 x 90 mm touchscreen display. The display and interface can be web enabled with remote monitoring and activation with smartphones, tablets, personal handheld devices and computers with access via the web.

AMS Instrumentation & Calibration Pty Ltd
www.ams-ic.com.au

LASER TRIANGULATION SENSOR

Bestech Australia has released the latest model of the Micro-Epsilon 1750 laser triangulation sensors, the optoNCDT 1750DR. This universal non-contact laser displacement sensor is specifically designed for measurement of specular surfaces or highly reflective objects such as mirror glass, reflecting plastics and polished metals.

The alignment of the optoNCDT1750DR sensor is tilted to ensure that the angle of incidence equals to the angle of reflection. This configuration is intended to minimise the radiation intensity from the reflected light and boost the signal quality for more accurate measurement. The design of the sensor is also compact to enable installation into restricted and narrow space. Utilising a class 1 laser also means that the device does not represent a hazard to the skin or eyes.

The 1750DR laser sensors are built with a real-time surface compensation (RTSC) feature, enabling the sensor to adjust itself for the amount of reflected signal received from the measured object during continuous exposure and in real time. This is useful for measuring an uneven surface and for dynamic measuring applications.

The optoNCDT 1750DR can be operated via a web interface and is compatible with industrial communication systems such as RS422, analog, Profinet and EtherNet/IP. It also offers a measurement rate of up to 7.5 kHz (adjustable) and an accuracy of 0.08% of full scale.

Bestech Australia Pty Ltd
www.bestech.com.au

ETHERNET SWITCHES

The Pepperl+Fuchs Comtrol RocketLinx series of managed and unmanaged industrial Ethernet switches are designed to meet both performance and environmental demands. They are made for applications that require extended operating temperatures, rugged housings, high-performance communication and reliable data transfer.

Users can choose from a wide selection of Power-over-Ethernet and Gigabit switches that meet the full range of application needs. Unmanaged RocketLinx switches provide a cost-effective solution for networks without the need for complex configuration; while for the configuration of complex industrial Ethernet networks, the managed switches provide more extensive features and configuration possibilities.

To suit different application needs, models are available with 5 to 28 ports in a variety of rugged housing styles.

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

DIGITAL TRANSFORMATION OR JUST CONTROL SYSTEM TUNING?

ADDRESSING DIGITAL TRANSFORMATION HYPE

*David Walker**

AI will have an important role in improving process performance; however, the first steps should be to appraise the capabilities of existing technology.

There is no doubt that AI has the potential to transform the process and manufacturing industries. AI and related technologies such as IoT, edge computing and cloud-based data platforms have created performance and optimisation opportunities that would have been unimaginable just a few short years ago. Condition monitoring, operations management, process optimisation and fault analysis are just some of the potential uses for AI, a field which is still evolving and yet to reveal its full potential.

What has unfortunately been missed by new technology entrants spruiking AI is that many solutions to typical process problems have always been available through existing control system technologies. What is now wrapped up in the language of AI and presented as new and innovative solutions are often just solutions that have the means to be addressed through the technology already present onsite. In many cases being approached using AI tools that are not always appropriate for the problem – delivered by companies that do not fully understand process and manufacturing – has the potential to add a degree of confusion, which often does not solve the problem and in fact can lead you further from the source of the problem.

While not looking to discredit the potential of AI, if used in ways which are not complementary to existing technology it runs the risk of having a costly and negative outcome, which can make people disillusioned and mistrustful of the new technology, blinding them to the real benefits available when it is used appropriately.

What is AI?

So how do we decide what is appropriate use of existing or new technologies? First of all, it is important to understand what AI is. Artificial Intelligence is a set of technologies that enable computers to turn data into information and make decisions. At its core are a set of machine learning tools that find patterns in data and create models from these patterns. These tools include curve fitting of historical data (known as regression analysis) and statistical analysis.

This certainly has many useful applications, provided there is sufficient understanding of how these tools work and can be applied. Because they are trying to predict the future based on the past, without knowing anything about the processes they are modelling, they are likely to fail in the case of an unexpected event. Anyone who has monitored trends in the share market will understand how history is a poor indicator of the future. For example, if we create a model around the output size distribution of a ball mill based on input rock size, hardness and ball mill speed, then it can predict accurately up to the point other parameters not included in the model change, such as ball size. Once unexpected variability is introduced, the models developed can lose their potential impact.

What can be done with existing technologies?

Mathematical modelling is an extremely powerful tool that has been around for decades. Unlike AI, it does not simply look at the past to predict the future. Rather, the model is developed to simulate the actual process. Such models, when properly implemented, will accurately predict an output based on any kind of event. For example, a mathematical model of a ball mill will predict product size distribution for any kind of input event.

Advanced process control (APC) using multivariable control algorithms (MVC) has been used successfully across a range of industries over many years to provide tight control in highly interactive processes. APC is well established in other industries but its potential has been little understood in the mining industry. However, it has been shown to be highly effective in grinding circuit controls, providing considerable benefits in production and quality.

Other tools, such as mass and energy balancing and mathematical modelling have been around for many years and are not AI. Yet increasingly these tools are presented as new and innovative AI-based solutions. There are numerous examples of technology businesses that are new to the sector promoting virtual flow or level meters as AI. These are simple mass balance algorithms that can be easily implemented in existing site control systems, without the excess cost, complexity and potential for misdirection that can arise from not understanding the process or existing technologies.

There is a wide range of tools available using existing technologies to solve process problems. What is now called an ‘edge device’ is just a renaming of existing technology. Field control devices have been around for decades and are capable of performing the complex functionality claimed by edge devices. But the introduction of this term has opened up the control environment to the IT world, and this has its own problems. Whereas control systems companies have had many years of experience in developing robust devices that operate reliably in extreme industrial environments, using software platforms that are bullet-proof, IT-based companies are introducing edge devices that are not designed for the rigours of industrial processes and the reliability expectations of industrial customers.

There are applications for some of these new devices, but once again their use needs balancing against process requirements, ap-

APART FROM THE COST OF UNNECESSARY DEPLOYMENT, INAPPROPRIATELY IMPLEMENTED AI SOLUTIONS CAN FALL SHORT OF EXPECTATIONS, MEANING THAT PEOPLE ARE LESS LIKELY TO SEEK OUT AI TECHNOLOGIES WHEN THEY WOULD BE THE RIGHT CHOICE.

plicability and whether they bring anything truly new and innovative to the mix. With existing field devices, it is possible to perform complex control and analytical functions — for example, real-time analysis of the noise in a pressure signal to detect pump cavitation. This is proven technology that adds the desired performance analysis and improvement, on a platform which is likely already resident on your site.

Where does AI fit into the picture?

New terms such as 'digital twin' are often used to refer to process models. But although the term is new, the technology is well established. So if these tools have always been available, why are there still problems to be solved, and what role does AI play?

Firstly, creating a mathematical model of a process or a piece of equipment, such as a ball mill, is more easily said than done. Fully understanding the physics of the ball mill is required to generate a useful model. But this is not easy to achieve. In cases such as these, building models using machine learning can provide a relatively simple way of building a useful representation that can be deployed quickly. These machine learning algorithms can be continuously evolving, reading data from the process and comparing it to the model. In this way, models can become quite accurate and informative over time.

Another example where AI can provide significant value is where there are networks of dependent processes, such as flotation cells and grinding circuits. Modelling these networks can be difficult to achieve, and AI can perform a valuable role in creating predictive representations of the process. One significant advantage of AI is that models can be created even when not all parameters are known or available. This is particularly valuable with processes such as flotation where critical parameters cannot be measured or inferred. In this case, building statistical models based on a large amount of accumulated data can assist in predicting production of the network of cells.

One of the challenges of introducing AI into a process environment is that of IT/OT convergence. This convergence is a result of the need to exchange data in real time between the process and analytics systems that are often cloud based. This introduces a range of issues around system availability and security, and requires a set of skills that are shared between IT and OT. Therefore, the need for these teams to work together is now a necessity, and requires organisational changes within businesses. IT/OT convergence also provides opportunities for tighter integration between control and IT systems, enabling seamless integration between process and business information.

Conclusion

AI has an important role to play in improving process performance and Yokogawa are investing heavily in this space with solutions already on the market. However, when starting the journey of technology evaluation to resolve issues with AI in mind, the first steps should be to appraise existing technology. Technology already available onsite can provide solutions to typical process problems, designed specifically for the process, without the cost and having to rely on complex black-box analytics. Solutions are often already residing on the plant, with process engineers who understand the technology, just waiting for someone to implement them.

Apart from the cost of unnecessary deployment, inappropriately implemented AI solutions can fall short of expectations, meaning that people are less likely to seek out AI technologies when they would be the right choice. There are many such instances where poor understanding and deployment of new technologies — such as fieldbus and wireless — have caused negative press around highly advantageous new methods for improving processes.

When considering solutions to a problem, the first question you need to ask is: are the physical principles of the process understood? Can information be inferred from other data? If so, generally speaking, the problem can be resolved with a simple algorithm in an existing system. If not, AI may be the best option, and this may open up new possibilities for your process. Before embarking on such a project, it is always worth talking to a range of vendors and engineers with expertise in the area to determine this best approach. This has always been the case, but even more so with the range of complex technologies available on the market.

In summary, when embarking on this journey, these steps will help to ensure that you choose the right technologies for the problem:

- Clearly define the nature of the problem. Is it a physical problem, such as difficulties in measuring an important parameter? Is it a control problem where process stability is difficult to achieve?
- Talk to the process engineers about the principals of the process. Are they understood? Can they be modelled?
- Consider the existing technologies available onsite. Talk to your OT people and the technology vendors about how the systems can be used to solve the problem.
- If exitsing systems cannot be used as a solution, consider an AI solution. This will involve site OT engineers, corporate IT and IT/OT specialists who understand the overall requirements, including the logistics of connecting the control system to the corporate network and the cloud.
- Consult with the control system vendor who has the OT/IT capability to facilitate the implementation and assist with site collaboration to achieve the best solution.

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Yokogawa Australia Pty Ltd
www.yokogawa.com/au

Using AI and an app to identify components

AI methods have long been successfully used in image processing with great success. Neural networks recognise everyday objects with greater accuracy than humans. Now researchers have developed an app that enables individual components with no barcode to be unambiguously identified within seconds. This application of neural networks will particularly benefit logistics companies, which can use them to speed up their incoming goods processes.

Companies are increasingly producing goods at different locations, working with multiple supply companies. There is no guarantee that all the components they receive are labelled with barcodes or type plates, which means that objects often need to be re-categorised in the receiving area. Employees then have to manually search the catalogue for similar parts to unambiguously identify them for further logistics processing — a painstaking and time-consuming task. Automated, digitalised recognition would be helpful to speed up the process. Researchers at Fraunhofer IPK in Berlin are applying machine learning methods with what are known as convolutional neural networks (CNNs) to recognise manufactured components, such as screws, clamps, nozzles, pipes, tubes and cables, as well as microcontrollers and other electronics.

©Fraunhofer IPK.

The app interface.

"CNNs have become the standard in image processing. Reliably recognising, say, 1000 everyday objects requires one million images for these networks to use as training data," said Jan Lehr, a researcher at Fraunhofer IPK. "Our job was to generate an algorithm for industrial applications even with little data so that, in our case, components with no code can be recognised automatically, easing the burden on receiving staff.

"Our goal is to enable the algorithm to easily distinguish even highly similar objects from each other, such as screws of the same standard but different sizes or turbochargers from different production series.

"We use specially developed algorithms to limit the search radius to five or 10 objects, so employees no longer have to search through the entire range typically found in a large warehouse."

To realise this, Lehr and his colleagues developed a detection system called Logic.Cube. The objects to be recognised, which have a maximum edge length of 40 cm, are placed in the cube-shaped device with an integrated scale and are photographed by up to nine cameras. An image processing algorithm measures the objects' height, width and length in order to calculate what size box or shelf space is needed. At the same time, the resulting image set is stored in a database, together with the material number. This image data is used to train the AI algorithm to enable it to recognise a wide array of different components.

The Fraunhofer IPK research team has also ported the detection system's functionality to a browser-based, operating system-independent app that works on smartphones, tablets, laptops and desktop computers. To do this, they had to expand the training dataset to include smartphone data and retrain the algorithm.

"We tested the algorithms with a hundred components that had been photographed in a wide variety of scenes, with 50 images taken of each part. Within seconds, the app shows the user five or fewer potential matches, independent of lighting, background and scenery. The recognition is so robust that it can replace manual searching," said the engineer.

The researchers reached recognition rates of 98% in Logic.Cube and reduced the search radius from 4500 images to five. They aim to get the same success rate with the app. The images will be uploaded over the internet or the company's intranet and stored in a local edge cloud, which is also where the actual image processing and recognition will take place.

"The AI algorithms run on the server and the smartphone or tablet app is the client," Lehr explained. The system is designed in such a way that it continuously collects additional data, and after a time this new data can be used to retrain the algorithms, resulting in a continuously self-improving system.

Currently the researchers are working to expand the set of image data and to digitalise the catalogue and integrate it into the app. Lehr and his colleagues are also optimising the algorithms to enable recognition of even highly similar-looking objects. In the test runs they conducted, the system correctly recognised even screws of the same standard but different sizes.

The app can also be used for surface inspection. An AI-based image shows whether parts have any scratches or corrosion, or whether they were damaged during transport or are just a bit dirty. AI methods are used to mark the relevant spots on the image so workers can immediately check the damaged areas.

"Manufacturing companies are often still cautious when it comes to AI," Lehr said. "We would be very pleased if our research work could help counter this scepticism and boost acceptance among employees."

A longer and more detailed version of this story can be read online at: https://bit.ly/32WcnVT

Fraunhofer Institute for Production Systems and Design Technology IPK
https://www.ipk.fraunhofer.de

SAFETY CONTROLLER/RELAY HYBRID

The Banner Engineering SC10 Series compact safety controller/relay hybrid is an easy-to-use safety controller for smaller machines that replaces the functionality of two or more safety relay modules. It features an intuitive user interface and advanced diagnostic capabilities.

In-Series Diagnostics (ISD) provides detailed status and performance data from each connected safety device, which can be accessed with a HMI or similar device, while intuitive, icon-based programming with drag-and-drop PC configuration simplifies device set-up and management.

The SC10 supports a wide range of safety devices, eliminating the need to buy and stock safety relay modules dedicated to specific safety devices. It provides two safety 6 A relay outputs each with three NO sets of contacts, and 10 inputs, including four that can be used as non-safe outputs. Industrial Ethernet two-way communication enables 256 virtual non-safe status outputs and 80 virtual non-safe inputs (reset, on/off, cancel off-delay and mute enable).

Turck Australia Pty Ltd
www.turck.com.au

RFID-CODED SOLENOID INTERLOCK

ATOM from Fortress Interlocks is a compact and robust RFID-coded solenoid interlocking device. It is externally approved and is suitable for applications up to PLe (Cat. 4). The metal housing and high retention force makes ATOM suitable for heavier industry applications.

High misalignment in the self-centring actuator covers any movement and inaccuracy in hinged and sliding door machine guarding. Additionally, ATOM's head has an open design manufactured in stainless steel to prevent dust, dirt and corrosion from impacting performance.

Available in multiple hardware variants, the device can be configured for applications where hazards persist after machinery is powered off. Multiple units can also be connected together with OSSD (output signal switching device) functionality preventing fault masking. The large LED lens at the base provides clear state indication from all angles and at a distance.

Fortress Systems Pty Ltd
www.fortressinterlocks.com

INDUCTIVE SAFETY SENSORS

Pepperl+Fuchs inductive safety sensors come with SIL 2 functional safety and PL d Machinery Directive approvals. With redundant implementation SIL 3/PL e can be achieved. High characteristic safety values enable easy integration into the safety loop and prolong operating intervals.

With intelligent electronics, the sensors do not have a dead band. This means that no minimum distance needs to be maintained between the sensor and the target. Simple standard metal targets can be used for detection; no special coding is required. A standardised OSSD interface and comprehensive safety documentation ensure quick and easy integration of the safety sensors.

The range includes four models with different designs (cylindrical, rectangular) and switching distances, creating a wide range of application possibilities. The rugged cylindrical versions feature an extended temperature range from -40 to +85°C and an E1 approval, making them suitable for mobile equipment applications.

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

LIGHT GRID WITH INTEGRATED MUTING UNIT

The latest generation of light grids from ifm allows for a muting mode without an external junction box or a muting relay being required, as they are already integrated into the receiving element.

The supported muting versions are available as either cross-beam or parallel muting. Both versions allow transported material to be safely passed in or out via the protected area. A status light, integrated into the receiver, allows for indication of the operating status.

The muting arms can be directly installed on the light grid and are available in two versions: either as muting arms with multi-beam sensors, similar to a miniature light grid, or as premounted mounting set with single-beam sensors. No complex installation and adjustments are necessary.

ifm efector pty ltd
www.ifm.com/au

TRANSPONDER-CODED GUARD LOCK

The Euchner CTM transponder-coded guard lock provides process and personnel protection in small spaces, making it suitable for securing small doors and flaps. At 120 x 36 x 25 mm in size, the switch is easy to integrate into packaging machines. Typical applications include case packers and dosing, filling and sealing machines. The ball actuator supported on an elastomer bearing can also secure doors with extremely small pivoting radii.

With an IP69 degree of protection, the switch's special hygienic version makes it particularly suitable for the food and pharmaceutical industries. The CTM provides Cat. 4/PL e safety door protection according to EN ISO 13849. Due to its different product variants and interfaces, the switch offers a solution for many applications and is well suited to Industry 4.0 applications because of its IoT-compatible communication via IO-Link.

Treotham Automation Pty Ltd
www.treotham.com.au

SAFETY CONTROLLER ANALOG MODULES

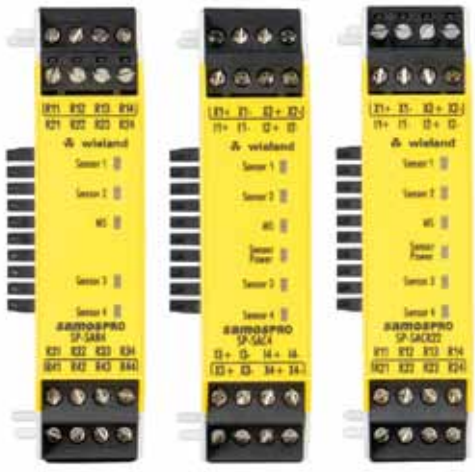
Wieland Electric has extended its samos PRO COMPACT safety controller range to include analog input modules. With the SP-SAC, SP-SAR4 and SP-SACR22, it is now possible to detect and further process analog signals for the purposes of safety control. These modules are suitable for use in process engineering applications in the glass, metal or chemical industry or also in specific areas of manufacturing such as conveyor systems, presses and CNC machines.

The modules support sensors with a 0/4–20 mA interface as well as temperature-dependent resistors like Pt/Ni sensors and deliver their analog data to the samos PRO COMPACT safety controller. The analog values can be monitored with 'Limit', 'Range', 'Relation' and 'Difference' function blocks in user programs created with the samos PLAN 6 software. These function blocks enable comparative or arithmetic operations involving analog data as well as scaling of the measured current values, and the presentation and visualisation of the analog values in samos PLAN 6.

Integrated USB and Ethernet interfaces enable access to the system, and industrial Ethernet protocols have been included. Further additional gateways for fieldbuses make integration into industrial networks possible. Up to three fieldbus systems can be operated from one samos PRO COMPACT in parallel.

For safe operation of the system, all inputs and outputs have uniquely assigned visual displays that clearly show the operating status at any time. The modules meet all safety standards, including SIL CL 3 according to EN 62061 and PL e/category 4 according to EN ISO 13849-1.

DKSH Australia Pty Ltd
www.dksh.com.au



OPINION

SMART MANUFACTURING FOR INCREASED FLEXIBILITY

If 2020 has taught us anything so far, it's that we must never be complacent. Just six months ago, leaders in manufacturing organisations had a fixed view of operations and things moved as they always had: the need for digital installations was not critical but more so borne out of a general desire to boost efficiency or build in remote support for breakdowns.

But when COVID-19 struck, the need for remote support, digital systems and flexibility revealed itself.

In an instant, the pandemic, and the forced lockdown it created, had underscored the importance of establishing advanced smart manufacturing capabilities in Australia and a new normal formed, marked by accelerated transformation.

The reality is that flexible manufacturing is increasingly a requirement for machine builders to stay ahead of the curve and offer value-added solutions to their customers. The importance of integrating flexible, solutions-oriented software to the plant floor has emerged out of the reaction to COVID-19.

OEMs are challenged to evolve at an unbelievably rapid pace. With manufacturers striving to meet increasing global demand, OEMs are in a position to bring significant value to their customers by making their machines smarter and their production lines more adaptable to the most extreme of circumstances.

Advances in smart machine technology have brought about a new era in manufacturing. Customers benefit tremendously from a differentiated machine offering that uses their existing platform and data and deliver more insights and value: smart machines that connect the plant floor with the enterprise, and generate actionable intelligence that adds an invaluable degree of operational flexibility.

Scalable analytics platforms illustrate this. They use smart machine technology to provide advanced analytics capabilities including machine learning. The OEMs around the world can initiate this technology with minimal cost, ultimately helping their customers to use their operational data to generate actionable insights and empowering them for more responsive, informed decision-making about their business performance. Integrating data from these different sources into a single model, this helps to detect any operational issues before they cause downtime and increases the overall efficiency of operations.

Manufacturing is also taking advantage of developments within the field of augmented reality, in which OEMs can maximise the potential of their machines while improving the efficiency of operating and maintaining them remotely and onsite. Implementing a series of step-by-step instructions to guide employees helps end users move closer to securing a competitive advantage, optimising resources by reducing employee training needs and improving downtime and changeovers. These are just a few examples of smart machine technology solutions that take companies to the next level of their digital transformation journey, and they're being put into practice.

Companies in Australia and across Asia Pacific are transitioning from predominantly hardware manufacturers to

solutions-oriented providers of fully digital production capabilities, equipped to meet the challenges and requirements of the IoT market growth.

The sudden and unprecedented impact of the coronavirus crisis underscores the importance of maintaining advanced manufacturing capabilities. Manufacturing in Australia has fallen over the last two decades from 13% of gross domestic product to 6% and is crying out for the appropriate investment to create new growth opportunities.

Services too are going through radical change, and it is arguable that things will never be the same in manufacturing again. Business models for manufacturers globally have been disrupted, and in their place are new and different understandings about the value of services and the power of smart technologies to quickly pivot and change operations. These business models have the potential to deliver huge value and a level of resilience that we may never see again for production-based ways of competing. The rate of digital transformation required in this new climate requires secure, reliable, seamless connectivity to all industrial assets and provides ample opportunity for the deployment of smart machine technology to more effectively meet the demands of manufacturers.

**Kumar Sokka is the OEM Business Director, Asia Pacific, for Rockwell Automation. He has over 14 years' experience in the technology and information industry and is a frequent keynote speaker and thought leader on digital transformation towards Industry 4.0 and Smart Manufacturing.*

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DIGITAL TWINS

A PRIMER FOR INDUSTRIAL ENTERPRISES — PART 2

Steve Dertien, Chief Technology Officer; Jonathan Lang, Lead Principal Business Analyst; David Immerman, Business Analyst, PTC

Many industrial enterprises are deploying digital twins and reporting significant benefits today.

As we saw in Part 1 of this article, digital twins are digital models that virtually represent their physical counterparts. This virtual representation of a physical product, an operational process or a person's task is used to understand or predict the physical counterpart by leveraging both the business system data that defines it and its physical world experience captured through sensors.

While a unique product, process or person may have a common digital twin, use cases are delivered through 'lenses' into this digital twin that are specific to the role and task. Three common use cases for digital twins fall under the areas of product engineering, manufacturing operations and customer service.

A product lens for engineering

Engineers have been discussing the concept of closed-loop product lifecycle management for decades. Until relatively recently, with the advent of smart, connected products, this has been limited to academic discussions. Now, with the new real-world data created by these connected products, the opportunity exists for the first time to understand product usage and behavioural characteristics of individual products or systems of products after they leave the factory. As companies seek to leverage this new source of product insight, they are discovering that digital twin architectures are the best way to create

> MANY BUSINESS LEADERS MAY BE SURPRISED TO LEARN THAT IF YOU'RE ALREADY GATHERING DATA FROM YOUR PRODUCTS, PROCESSES OR PEOPLE, LITTLE ADDITIONAL INVESTMENT IS NEEDED TO STAND UP A BASIC DIGITAL TWIN MODEL.

meaningful value from the data. By bringing in real-world data and analysing it in the context of physics-based engineering simulation, product designs and user experiences can be improved according to real-world facts, rather than assumptions.

Key business outcomes

Key outcomes from digital twins in relation to product engineering are:

- **Engineering excellence:** Real-world usage data combined with product simulation enables engineers to adapt to changing markets and to optimise future product designs for higher quality, and reduce engineering costs while accelerating time to market.
- **Downstream efficiency:** Extending the digital thread to downstream stakeholders can enhance cross-functional collaboration, enabling efficient change management in manufacturing and service processes, eliminating scrap and rework, and reducing lead times. The twin can also be adapted to generate manufacturing and service instructions that can be paired with the product inside and outside the organisation.
- **Success-driven design:** Being able to analyse the as-designed versus as-used product data to optimise product requirements can help to better fit customer needs and bring differentiated product enhancements to market before the competition.

A process lens for manufacturing and operations

Operational transparency is a costly endeavour exacerbated by the proliferation of information systems. Insights often go undetected due to the inability to connect the dots between disparate information systems. After building a digital thread of an operational workflow, a process lens can be deployed to combine, analyse and deliver operational insights that blend real-time updates from connected assets and workers with production expectations. The process lens often leverages multiple digital twins to provide a system-wide view of a total operations or manufacturing environment. Through analysis, businesses can adapt and orchestrate operational processes for greater forecasting accuracy and improved operational effectiveness.

Key business outcomes

Key outcomes from digital twins in relation to manufacturing and operations are:

- **Agile change management:** It is possible to access customer order and supply chain data and analyse it against current operational configurations to adapt processes — in order to develop production plans optimised for speed and agility. These plans can also be shared upstream and downstream to improve efficiency across the supply chain.
- **Reduced operational risk:** Predictive analytics can be enabled to simulate the impact of unplanned operational changes, reducing risk.
- **Optimised production:** Combining KPIs and operational insights across production environments creates enterprise-wide reporting consistency and benchmark best-in-class processes to ensure lean operational excellence.

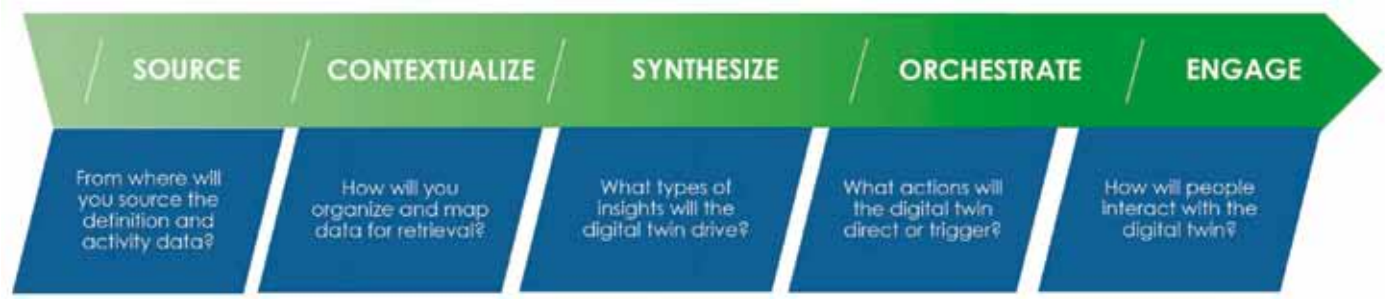

Figure 1: A framework for digital twin development.

A 'customer success' lens for service

The cost of downtime and production delays can absolutely cripple industrial enterprises' relationships with their customers and severely harm their bottom line — both for producers of industrial equipment as well as users. It is no secret that downtime costs global industries millions of dollars in lost revenue every year. Combining the digital thread and real-time sensor data from connected products, digital twins for service and customer experience help manufacturers move from being reactive to being prescriptive in the way they deliver experiences and outcomes for customers. Machine learning, remote diagnostic capabilities and physics-based simulation all help to drive a greater level of understanding of how a product or service and expected outcomes are experienced by the customer. A digital twin of a product or service procedure in a customer environment unlocks new revenue opportunities and strengthens customer relationships.

Key business outcomes

Key outcomes from digital twins in relation to customer service are:

- **Technician success:** Consolidating enterprise, engineering and service-network data into role-based views enables providers of products and services to optimise service process experiences and deliver new self-service capabilities to their customers.
- **Reduced downtime:** Proactively identifying machine service and maintenance needs by simulating historical patterns or design expectations of machine performance against real-time sensor data helps to reduce unplanned downtime and maximise asset utilisation and customer value.
- **New business models:** It may be possible to unlock new usage- or outcome-based service contracts that leverage usage, availability and operational data to simulate and orchestrate product parameters and deliver remote updates and value-added services.

Building your digital twin

As we've seen, there are no shortages of opportunities to develop digital twins to improve business outcomes and decision-making. While identifying opportunities can be overwhelming, the aforementioned use cases are proven in the market to be the most simple and straightforward to set up, delivering a quick return on investment. From there, these use cases can be adapted and extended to further differentiate product and service offerings and drive operational effectiveness in your processes.

The time is now for industrial enterprises to build out their digital twin strategies. With the maturity of the enabling technologies and digital thread initiatives reaching critical mass, many companies are taking stock of their current capabilities and moving quickly to fill the gaps. The way digital twins are delivered through various lenses can vary greatly based on the specific use case being pursued, but core considerations should be addressed based on necessary capabilities. Companies seeking to advance their digital twin strategy will benefit from organising current and future capabilities into the following framework. From there, specific use cases can be plotted to organise requirements and develop a plan of action.

Source

A digital twin requires you to combine the digital definition from related business systems with real-world data and insights from the physical world via sensors. Companies must decide what source data they will include, for example, manufacturing process plans or operating procedures that define a process combined with the real-world telemetry and sensor data from manufacturing and production environments. Adding additional sources to its definition, for example, supply chain data from an MES system, can drive increased overall context for the twin as well as unlock additional use cases without rework. Additional technologies continue to add to potential sources of insight. In the future, with the bounty of sensor data coming online through AR devices, people and the spaces they inhabit (factories, buildings, etc) will be defined and integrated into twins as well.

Contextualise

Digital twins give unified insight into the data connected by the digital thread. Once a use case is understood, unique identification and organisation of data surrounding an individual product, process or person can be mapped and organised to inform the twin model. It could be contextualised into an overall process, enhanced with behavioural data or used to align to desired KPIs. Understanding the overarching goals of the twin will help to contextualise it into the type of digital twin model that makes the most sense.

Synthesise

Analytics can be used to add value for certain use cases to inform business decisions with greater accuracy and unlock hidden insights, or the value can be self-evident. Analytics could be applied on the mapped data to answer questions along common frameworks, for example, descriptive answers to questions like how a product is performing, to diagnostic questions around cause of failure, and predictive or prescriptive questions that simulate potential scenarios and optimise performance outcomes.

Orchestrate

Orchestration is where these insights are put to task. Triggers can be created that automate or direct actions based on the result of the answer or analysis. For example, a process trigger could be put into place to dispatch a technician or create a customer service ticket for a product failure. You could automatically propose remote configuration updates based on performance characteristics. It is also possible to deliver updated KPIs and worker priorities based on customer or supply chain activities. Whatever questions you seek to answer, a corresponding action can be orchestrated to react, and measurable KPIs and outcomes can be captured.

Engage

Digital twins are delivered or interacted with through a frontend UI or 'lens' that is role or task based and specific to a given use case. They can be delivered through interfaces such as desktop and mobile devices, and emerging technologies like augmented reality provide additional options. In fact, augmented reality provides the capability to capture spatial data related to environments and workers, and to eventually develop digital twins of these previously undefined spaces and processes. These technologies also offer enhancements to the fidelity and user experience of digital twins and make use cases accessible to new stakeholders such as deskless workers.

Getting started: where to begin your digital twin journey

Many business leaders may be surprised to learn that if you're already gathering data from your products, processes or people, little additional investment is needed to stand up a basic digital twin model. In addition to the requisite digital thread connecting silos of interrelated data, you may even have the enhanced front-ends and analytical capabilities in place. For companies looking to extract real-world insights to improve product design, for instance, they need only to securely deliver that product sensor data back to product engineering systems in a compatible format for simulation.

Below are a few practical actions to take today to advance your digital twin strategy:

- **Assemble cross-functional teams** to understand pain points or use cases that will break down silos and deliver value to multiple teams, producing the greatest ROI and enabling the greatest flexibility to adapt and mature the digital twin over time.
- **Inventory your technology initiatives and the goals they seek to achieve** to determine where digital twin use cases can be enabled with minimal investment and predefined success metrics.
- **Identify business partners** whose technology ecosystem integrates easily across your entire technology footprint and who possess the requisite capabilities. Consider not only what can be done today, but how your twin might evolve over time to avoid costly and challenging integration projects down the line.

Gone are the days of digital twins being a concept to daydream about in the future. Many industrial enterprises are deploying digital twins and reporting significant benefits today. Many more have the building blocks in place and are missing out on untapped value — all they require is the unified vision and partnerships to construct the model that fits best to solve their unique challenges. Successful implementations will require executive-level buy-in, the right mix of technology capabilities and domain expertise often stemming from partner ecosystems.

The confusion surrounding digital twins is rooted in their nearly unlimited potential coupled with varying, and often narrow, schools of thought in industry. The time is now for industrial businesses to create a digital twin strategy, to take a step back and to view the mosaic of technology initiatives that exist today and to connect them to executive-level business objectives.

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NEW PRODUCTS

MULTIFUNCTION COMPACT INVERTER

The 3G3MX2 series multifunction compact inverter supports standard induction and permanent magnet motors, and includes an EtherCAT fieldbus system, PID control and built-in safety. Options are available for all of the major open network systems, including EtherCAT, Modbus-RTU, CompoNet and DeviceNet.

The product is suitable for low- to medium-torque applications. It delivers 200% starting torque near standstill (0.5 Hz) and can operate in sensorless vector control mode. This allows the device to be used in applications where closed-loop AC vector drives were previously used.

Category 3 safety is embedded in the unit, according to ISO 13849-1, with dual safety inputs and an external device monitoring (EDM) output. No external contactors on the motor side are required, meaning simple wiring for the user.

All drives in the product range have dual power ratings. These are heavy load (where constant torque is required) and light load for fans and pumps, where the torque can be reduced once the load is in motion. The 3G3MX2 is a drive and position controller in one, suitable for modular machines where moderate positional accuracy is required. Speed synchronisation is also possible, with no additional programming needed.

Specially developed application functionality enables the product to solve simple positioning tasks without the need for an external controller. Users can select up to eight positions, plus home. Alternatively, utilising a flow chart programming tool, users can create programs with up to 1000 lines of code, with up to five tasks running in parallel.

Omron Electronics Pty Ltd
www.omron.com.au

BALL VALVES

SPX Flow has released an updated range of ball valves from its APV brand. The BLV1 Series valves are said to offer both durability and economy for a variety of applications in hygienic and non-hygienic applications.

The BLV1 Series share common parts with other APV valves, providing plants with a common look, controls interface and spare parts holding benefits. They are available with a simple manual handle with or without position feedback, as well as the same pneumatic actuators and a range of control units offered on the APV SV/SVS butterfly valve series. Advanced control unit options include the CU4 Series with ultrabright LED position sensors and internal solenoids.

The BLV1 design is cavity filled with reinforced PTFE seats, stainless steel construction and FDA-approved food-grade materials to provide hygienic performance. For utility service and other industrial chemical applications, the valves are designed with high temperature and pressure ratings and without the use of silicone. Other features include a wide range of both inch and metric sizes, full port opening for unrestricted flow in the open position, and lockable manual handle for added security.

SPX Flow Inc
www.spxflow.com/au

GEARBOX CONDITION MONITORING SYSTEM

HYDAC in close collaboration with SEW-Eurodrive Australia has designed a gearbox maintenance solution called 'The Guardian Angel'.

This solution is an all-in-one turnkey solution, offering condition monitoring, conditioning and isolation of the gearbox. This total isolation means that the gearbox stays free from any ingress of water, dust, moisture, etc.

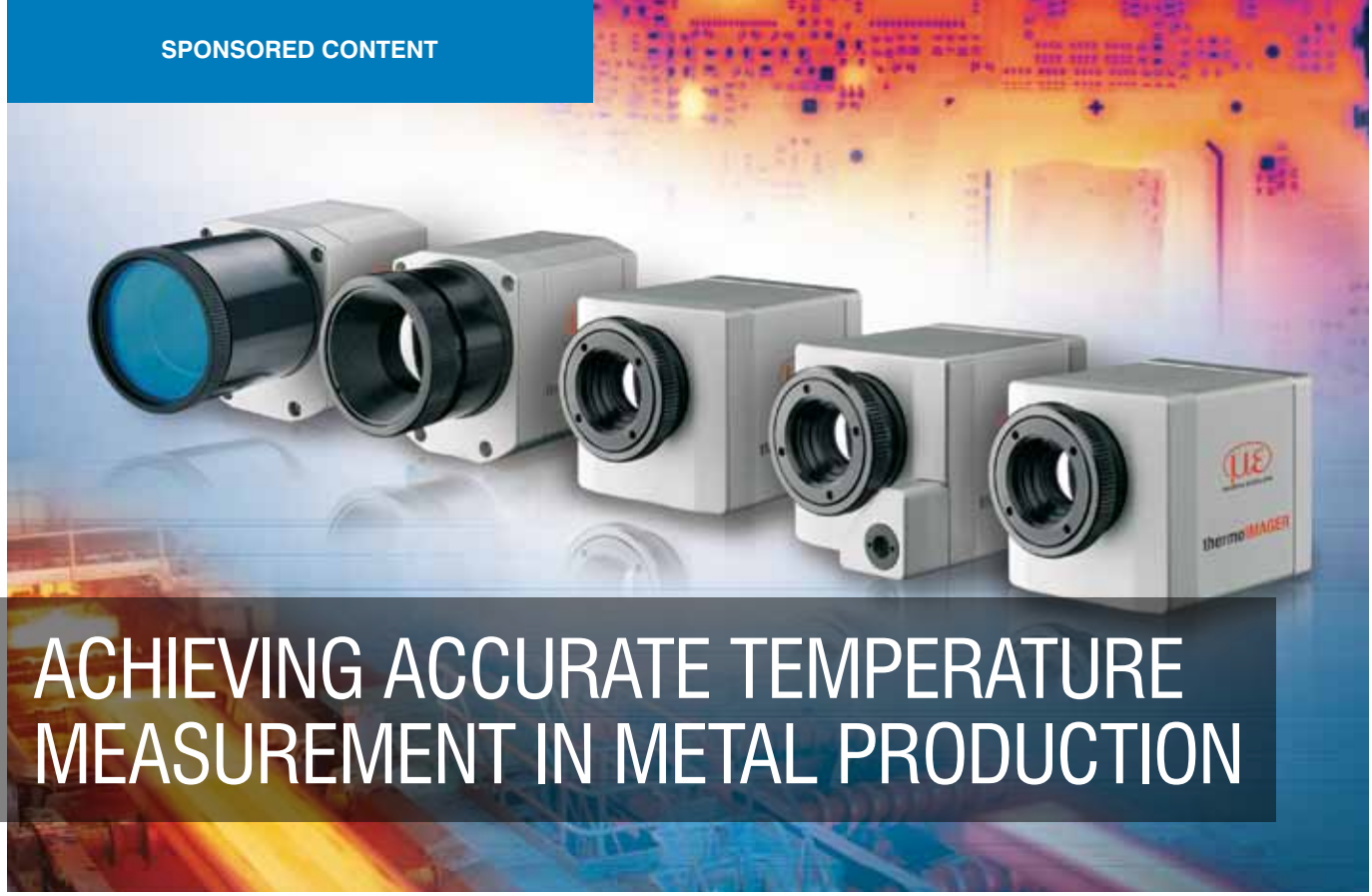
The aim was to achieve extending the lifetime of the gearbox oil by a factor of 300%, as well as doubling the gearbox oil change interval time, as well as giving access to remote condition monitoring of the gearbox for critical drives.

This solution offers full condition monitoring, including oil condition, water ingress, change in dielectric constant and change of electrical conductivity.

Full conditioning is also offered, involving a totally active lubrication system with a closed-loop high viscosity screw pump, fine filtration and high efficient air blast cooler. Full isolation means zero external contaminants, which is achieved through total isolation by means of breather bag technology.

As a result, the oil in the gearbox is maintained cool, dry, clean and at the required viscosity, with the aim of maintaining optimal lubrication capabilities. The turnkey solution alerts the end user of any anomalies of the system and advises the operator of any required actions. It helps the gearbox's OEM in its predictive maintenance program, with no surprise downtime and reduction in service costs. This is a solution ready for the future with the possible integration of ferrous particle sensors, vibration sensors and cloud-based capabilities.

HYDAC International
www.hydac.com.au



ACHIEVING ACCURATE TEMPERATURE MEASUREMENT IN METAL PRODUCTION

Temperature monitoring and control are crucial steps in almost every industrial manufacturing process, particularly metals. Temperature needs to be strictly controlled to ensure the quality of the finished products in the metals industry. Many existing metal processing industries also need to consistently monitor the process temperature for surveillance purposes — to ensure workplace safety and process optimization — in areas such as blast furnaces, rolling mills, die forming and hardening processes.

Non-contact sensors such as infrared thermometers and thermal imaging cameras are suitable for this type of industry due to the limitations in using contact-type sensors. They also have the capability to measure the wide temperature ranges from 400°C to 3000°C that are commonly encountered in metal processing industries, and they can provide reliable measurement at high temperatures.

The Micro-Epsilon thermoIMAGER TIM M1 is a compact thermal imaging camera with an extremely short wavelength of 0.85–1.1 μm for reliable non-contact temperature measurement on hot metal surfaces. The emissivity error due to the higher radiation intensity from metals at very high temperatures, and temperature differences due to metal oxides, are minimised when measured in this wavelength band.

The TIM M1 also has a very large measurement range from 400°C to 1800°C and a real-time output rate of 1 kHz to monitor fast industrial processes. The camera is also equipped with a jacketed cooling system to withstand hot ambient temperatures up to 315°C.

The fast sampling rate enables the detailed analysis of fast thermodynamic processes that occur during metal processing, as well as temperature adjustments in real-time processes. The system can be configured to output temperature values or alarm values via the process interface.

In real-world applications, this online thermal imager can be permanently installed for early detection of wear in the refractory lining of torpedo cars, slag cars and ladles. It can also be programmed to send an automated alarm whenever hot spots are detected on the outer walls of furnaces. Maintenance can then be effectively scheduled to reduce and eliminate the risk of shutdown.

Thermal imagers can also be used for continuous measurement to monitor the forming temperature in rolling mills or within die forming processes. However, there are more cost-effective solutions, such as using a high speed infrared thermometer with a short wavelength, as it does not require the detection of hot spots.

The thermoMETER CTRatio M1 is a high-speed ratio pyrometer specifically designed for the measurement of red-hot and glowing metal objects with an operating wavelength of 0.7–1.1 μm. It is a more suitable sensor for the measurement of moving objects in the production line due to its fast response time. This glass-fibre ratio pyrometer is not affected by interference such as smoke, fog or dust that may partially or fully conceal the moving object.

As an example, the CTRatio high speed pyrometer has been previously installed in rolling mills to continuously measure forming temperature between individual rolls. This allows the optimisation of the process parameters and resulting product quality, since temperature shifts directly affect the quality of the finished product. It is also suitable for measuring temperature during die forming processes, as the temperature of the blank needs to be precise before it is hot formed. It can also be used to measure the temperature after forming and before being sent for storage.

In induction hardening processes, an optimum temperature-time profile is essential to produce metals with the desired microstructure. For easy control and monitoring, the CTRatio high speed pyrometer can be permanently installed for continuous monitoring or alternatively, a handheld pyrometer can be used for sporadic measurement.

BESTECH
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Bestech Australia Pty Ltd
www.bestech.com.au

NEW PRODUCTS

HMI COMPUTER

The Aplex ARCHMI-8XXA Series industrial HMI solution for IIoT is powered by an Intel Apollo Lake Pentium N4200 or Celeron N3500 processor. It is available in various sizes from 7″ to 21.5″. It supports projected capacitive or resistive touch screens that provide a multi-touch solution with an IP66 true flat front panel display design.

This series features a rugged and fanless design with its aluminium die-casting chassis supporting heat dissipation and protection against impact. It also has an easily accessible storage design for hard drive swapping. An optional I/O board, the TB-528 Series, is available for extension modules including Mini-PCIe, CANbus, PoE, USB, COM and an isolated I/O Module to provide flexible I/O configurations to meet the needs of a variety of industrial applications.

The ARCHMI-8XXA Series also features a smart battery UPS module option to provide emergency power backup.

It has been designed to suit various factory automation applications such as simple production tasks, real-time monitoring, intelligent automation control and data processing.

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

ROBOT SCREWDRIVER TOOL

OnRobot has released a screwdriver robot attachment designed to allow manufacturers to automate a wide range of assembly processes quickly, easily and flexibly.

Programming the OnRobot Screwdriver involves entering the appropriate screw length and torque value into the user interface that is integrated into the teach pendant of any typical robot. With precise torque control and embedded axis, the OnRobot Screwdriver automatically calculates the speed and force required for consistent, accurate screwdriving. The Screwdriver can detect incorrect screw length, which can help improve overall quality and reduce scrap. With the Screwdriver's z-axis, screws are retracted inside the tool and driven automatically once the robot arm moves into position, which reduces robot arm movement and additional programming. Screws up to 35 mm long are retracted completely inside the Screwdriver when moving until the screwdriving process is safely initiated, enhancing its collaborative capabilities.

The Screwdriver can handle a wide range of screw sizes and lengths, from 1.6 to 6 mm diameter, and up to 50 mm long. With its simple programming and easily exchangeable bit system, the Screwdriver can be quickly changed over to a different screw size, length or product line in minutes, which minimises downtime and improves productivity.

Offering precise torque control from 0.15 to 5 Nm, the Screwdriver is compatible with OnRobot's One System Solution, a platform that provides a unified mechanical and electrical interface between robot arms and any OnRobot device.

Scott Automation & Robotics Pty Limited
www.scottautomation.com

HIGH-CAPACITY ETHERNET SWITCH

The Hirschmann DRAGON PTN 2215 is a high-capacity switch with HiProvision software suitable for use in large networks. It features an expanded housing for up to 15 interface cards, Ethernet-based MPLS-TP technology and support for future growth into 100 Gb applications.

High throughput rates are possible due to MACSec-ready 10 and 40 Gb interface cards, with security still maintained at a high level. The DRAGON PTN 2215 high-capacity switching controllers handle traffic up to 720 Gbps each and are also backwards compatible with earlier PTN units, allowing the use of existing cards.

Consisting of a variety of modules and port options for increased network flexibility and integration, the product is fully modular and can be configured as a completely redundant system to ensure network availability in case of component or path failure.

Control Logic Pty Ltd
www.controllogic.com.au

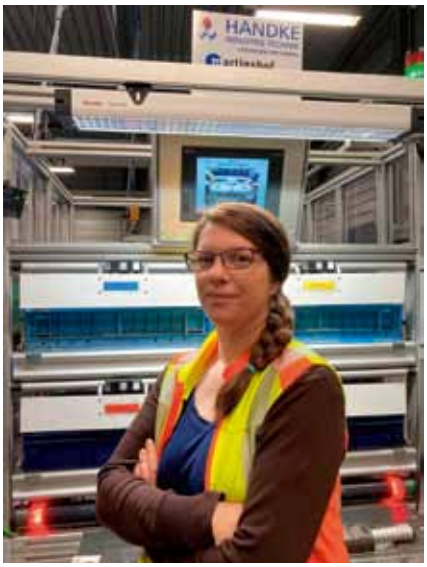
Modern automation empowers workers with handicaps

In spite of advancing digitalisation, manual workstations are still indispensable, because automation is not always profitable with small batch quantities or complex processes. Such workstations are preferred at the Martinshof Werkstatt Bremen, a sheltered workshop for a mixed workforce including people with handicaps, as they are ideally suited for integrating people with physical or cognitive handicaps into working life.

"Poka Yoke has empowered our workers," said Miriam Berger, in charge of Production Planning, Martinshof Werkstatt Bremen. "We use automation to avoid mistakes that previously occurred in the production process. Everyone must be able to work smoothly together."

The Japanese Poka Yoke principle, which aims at the systematic elimination of human errors, coupled with Mitsubishi Electric's 'Guided Operator Solutions', ensures high quality for Martinshof's customers, which include well-known automakers in the region.

With some 2200 employees, Werkstatt Bremen is one of the city's largest employers as well as Germany's oldest and largest workshops for people with and without handicaps. Apart from job order and contract production in the fields of metal and woodworking, electrical assembly, filling, and packaging, Werkstatt Bremen employs 500 workers alone in the automotive business sector, and has been supplying local automakers for more than 30 years.



Handke Industrie-Technik, a longstanding supplier to Werkstatt Bremen of manual workstations, and a premium solution partner of Mitsubishi Electric, recognised the unique opportunity. Together with Mitsubishi Electric, Handke developed a Poka Yoke solution for adapted working and a prototype of the error-free workstation was installed in the production line. Since May of 2018, a total of four identical zero-error workstations have been in use for automotive parts production.

"The main challenge of this project involved the integration of existing technology into the new error-free workstations," said Nils Knepper, Senior Product Manager Modular PLC/Software at Mitsubishi Electric Germany. "However, thanks to the interfacing features of our Poka Yoke controller, this was not a problem."

The MELSEC iQ-F series PLC, installed onsite in a small control cabinet, is the heart of the solution that controls the picking and assembly sequences. Apart from Mitsubishi Electric's own components, the system can also handle third-party sensors and actuators. In this case this included the digital torque wrench and a system for industrial image processing. The connection of a barcode printer is being implemented, and due to existing conventional interfaces, this can be done easily by the PLC.

"During the design of the user interface, Mitsubishi Electric was highly flexible, and took all our requirements into account," Berger said. "Because many of our employees cannot read very well, we make use of smileys and other symbols. In addition to process reliability, the Poka Yoke workstations have the great advantage for us, unlike the past situation, as practically any employee can now do the job." The supporting visualisation uses a 10-inch touchscreen terminal connected in the background to the Poka Yoke controller.

The hardware and software solution from Handke and Mitsubishi Electric delivers simple scalability, convenient configuration, programming and commissioning as well as further connection possibilities (including MES and ERP). And as soon as freedom from errors is achieved, and the technical potential is available, Werkstatt Bremen will investigate whether the buffer store can be dispensed with in the future, so that after assembly is completed the parts can be directly shipped 'in time' to the automaker.

"The need to prevent errors exists everywhere during production and assembly," said Andreas Kebbel, Managing Director of Handke Industrie-Technik. "What is most important is the quick and flexible adaptation to the needs of the persons working there, and to the requirements of the process."

That is why Mitsubishi Electric and Handke offer their solution in the form of a modular system with a wide range of components and interfaces for operator guidance. Among others, these include mechanisms to ensure the correct picking of parts, such as light barriers, pick-to-light pushbuttons (alternatively: pick-to-voice), barcode scanners and proprietary pick-to-door devices with stroke switches. Moreover, there are monitoring devices such as electric screwdrivers with torque and angle detection, plus vision systems as well as opportunities for robot integration. HMIs from Mitsubishi Electric's GOT2000 series are used for displaying the individual process steps, offering direct connectivity to the Poka Yoke controller, and meeting every display requirement from text through graphical symbols up to animations and augmented reality.

Mitsubishi Electric Australia
www.mitsubishi-electric.com.au

AUTOMATION CAN IMPROVE WORKPLACE SAFETY

BUT VIGILANCE IS STILL A MUST

Harry Mulder, Engineering Manager, Omron Oceania

As industries begin to rely more heavily on automation, the general consensus is that new technologies are helping to improve workplace safety.

By implementing robotics and automation, manufacturers can boost productivity and drive efficiencies. Automation is freeing employees from repetitive, unsafe and potentially hazardous jobs, enabling them to conduct higher level tasks. With advanced technology, workers can be shielded from temperature extremes and radioactive or toxic environments. And automation can reduce certain types of worker injuries, such as those typically associated with repetitive upper arm motion and lifting.

In modern workplaces robots are being used to handle heavy loads and for repetitive pick and place tasks, and with advanced software, industries can process large amounts of data for preventive maintenance. Users can now determine when machinery is likely to fail based on machine run times and exceedance of optimum operating parameters.

But new technology brings new types of risk.

Without the appropriate planning, robots and automated processes can create new hazards, resulting in other types of injuries — sometimes with catastrophic consequences. Machines are not always equipped to make intelligent decisions. This problem may be further compounded by poorly designed user interfaces.

Risks and hazards

Employers have a duty to inform employees about the risks and hazards associated with robotics and automated machinery. For instance, it is a common belief that collaborative robots (often referred to as cobots) are easy-to-integrate machines that can work seamlessly alongside human workers. However, this doesn't necessarily make them exempt from the safety regulations associated with regular industrial robots.

Many plant managers mistakenly assume that all unguarded cobots are perfectly safe for use alongside their employees: after all, they are 'collaborative'. But this simply isn't true.

Deploying a cobot safely requires a comprehensive risk assessment. The assessment should consider all the risks that may occur while the robot is in operation, performing the tasks required of it, as well as the potential risks when the cobot is between tasks.

It is imperative that users understand the safety requirements of all new automated systems. Studies have shown that a heavy reliance on automated processes may result in changes in human behaviour, including increased complacency. Because a system is functioning satisfactorily, some employees mistakenly believe it is not necessary to closely monitor the entire process. Such complacency can lead to accidents.

How to reduce risk of injury

It is vital for industries to closely examine human–machine interactions. Employees must be properly trained and adequate guarding provided for automated machinery to reduce potential injury rates.

Operations executives must anticipate the variety of new tasks that may be required of employees following the installation of robots or other types of process automation. They also need to be able to assess any new risks to employees associated with their changing roles.

Such changes may create different types of safety and health issues for workers designated to operate new machinery or continuing

in their current roles working alongside robots. Some employees may move into new roles that are more complicated or even physically strenuous to perform or monotonous. This could lead to increases in work-related musculoskeletal disorders, mental fatigue, higher error rates and a deterioration of overall quality.

Another critical issue with automation involves failing to allocate sufficient space for humans and automation to co-exist. Businesses must ensure sufficient work space is allocated to allow humans to work safely with machines.

Protecting your most important asset

So how do industries balance human worker input with increased automation to produce quality, consistent work while also ensuring employee safety?

With production machinery increasing in speed and complexity, it is paramount that machine safety is incorporated to protect your most important assets (you and your workforce). As enterprises respond to the challenge by expanding their use of automation, they need to sharpen their focus on how these investments will impact worker safety and health.

The advantage of automation is that it allows for the application of Functional Safety (IEC 61508), where safety is implemented by electronic means. This usually means a microprocessor-based system is used to reduce the risk to an acceptable level.

By choosing reliable and effective automation systems, a safer factory can still be flexible and adaptable. A wide variety of input sensors and switches are available to detect potentially hazardous conditions, safety-rated controllers to execute logic and programs and output driving devices.

Further regulation may also be essential to help prevent automation-related safety incidents.

Regulatory bodies must work diligently to keep up with new technological advances in the workplace.

Learn how to identify hazards

Machine safety within manufacturing is mandatory and employers should keep abreast of all the latest developments. Manufacturers must find innovative safety solutions to improve their operations. They must know their responsibilities and how they can minimise risk. They must also learn how to identify hazards and know how to reduce them. The formal procedure for this is called a risk assessment (ISO 12100:2010).

By taking steps in advance to understand the potential benefits and carefully assess the risks associated with automation, manufacturers will be well positioned to maximise the productivity, performance and sustainability of these initiatives.

Omron Electronics Pty Ltd
www.omron.com.au

ARE WE EMBRACING DISRUPTION?

Whilst the COVID-19 pandemic has been devastating for the economy it has also demanded a review of our priorities within the manufacturing and supply chain. Currently we hear lots of rhetoric from politicians and business leaders about bringing manufacturing back to Australia and enforcing local supply chains to nullify the effects of external catastrophic events such as COVID-19. My question is: are we embracing a disruptive influence to drive permanent change, or is the rhetoric an example of the 'groupthink' phenomenon?

According to *Psychology Today*: "To recognize groupthink, it's useful to identify the situations in which it's most likely to occur. When groups feel threatened…they may develop a strong "us versus them" mentality. This can prompt members to accept group perspectives, even when those perspectives don't necessarily align with their personal views."

When we come through this pandemic, when the economy starts to recover, when the dust settles and behaviours return to normality, will we still be of this united opinion as a nation or will supply chains start to revert to the lowest cost product?

In my opinion this is potentially a real turning point for Australian manufacturing; however, we have a collective responsibility to ensure that the thought process is a rational long-term strategy rather than a groupthink short-term reaction. We have an opportunity to adopt new techniques to unlock commercial value and ultimately advance Australia's economy through smart manufacturing.

As a country we need to adapt our manufacturing processes so that we can compete internationally, offering the highest value proposition and in turn grow the manufacturing economy within the country. Gains in manufacturing efficiencies can be achieved from factors that include operational requirements, such as identifying reasons for (and reducing) lost production time, and building more flexible production lines and processes with the ability to adapt to different products with a minimum of set-up time. In addition, tracking and traceability is playing a strong role in ensuring that the correct manufacturing process has been followed and implemented and that the product is delivered in its original condition. In this age data is key — not only creating and harvesting the data but using this to make informed decisions both dynamically in real time and retrospectively for process improvements.

While the above examples relate to the core competencies of our business at Balluff, I believe that as suppliers we must work together to develop high-level relationships, to collaborate and educate Australian manufacturing to understand and embrace the challenge of new technologies. With support from government and industry organisations we should help manufacturing overcome real and perceived barriers to investing in new techniques. An example of a collaborative approach for the 'greater good' is the Open IIoT consortium of companies incorporating Balluff, SMC, Beckhoff Automation, Zi-Argus and Nord Drivesystems, whose mission is to demystify Industry 4.0, IIoT and other related topics — and to break down the jargon to address topics of real business value, security, data ownership and IT integration. With a collaborative effort we can offer a wider base of knowledge and expertise to help manufacturers understand and identify key areas of concern and take realistic steps to implement new techniques to gain competitiveness.

Will we embrace the opportunity presented by COVID-19? I think we all have a collective responsibility to ensure that we do.

Jim Wallace is National Sales Manager for Balluff Pty Ltd. Having worked in the UK, Europe and Australia, Jim has over 20 years' experience in helping customers to automate with innovative sensing, networking and RFID solutions.

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TIM QVGA HDT-100

New Thermal Imager for Body Temperature Screening in Factories

The TIM QVGA HD T-100 is the newest addition of our industrial thermal imaging camera for accurate detection of body temperature in crowd or individual person. It has an optical resolution of 382 x 288 pixels and temperature range of -20°C to 100°C with measurement accuracy of 0.5°C when used with the high precision TM-BR20AR-TIM ambient temperature radiator. It can also be easily integrated with standard and industrial process interface.

This camera system is ideally suited for applications in entrance halls or foyers of public places including factories and office buildings. It can accurately detect individual with elevated body temperature from the crowd and alert the operators with alarm function to enable discreet investigation and isolate the individual from the crowd.

This system has the advantage of fast and non-contact detection of body temperature. It is not intended for medically diagnose for fever or certain disease.

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