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CONTENTS

ON THE COVER

How do you optimise a level sensor that already has everything: the best focusing, highest accuracy, simple operation and universal communication? What sounds like an obvious question has led VEGA to create much more than just an even better sensor. When using the new VEGAPULS 6X, it's not just the sensor that counts, but what can be achieved with it in the application: simply better processes.

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SHAPING FUTURE PRODUCTION LANDSCAPES

SETTING THE COURSE FOR TOMORROW'S WORLD OF PRODUCTION

The three key factors of people, technology and adaptation will form the basis of future successful production environments.

One thing is certain: the very first ripples of the megatrends announced by futurologists were enough to shake entire branches of industry to their very foundations. Digitalisation, in particular, is steamrolling its way through the entire field of industrial production. Transformation towards a globally networked and integrated economy is making itself felt in all sectors. We are therefore at a juncture in which it is apparent that the mechanisms we use to act and the way we manufacture are undergoing fundamental change.

Most companies are currently focusing on using new technologies to make selected processes more flexible or to increase output. Flexibility and efficiency are key building blocks in the production environments of the future. However, companies need to take a step further and consider how holistic and sustainable solutions can be implemented to gear production environments towards dynamic market changes.

Questioning established decision-making

Faster, bigger, cheaper — this credo has been considered irrefutable in industry for over a century. Stronger throughput performance and faster conveyors helped to make production a little more efficient each year. Over the decades, this approach ensured relatively continuous improvement in cost-effectiveness on the basis of economies of scale.

The first approach to ensuring continued success is often the automation of processes. There are still sectors and production processes with great potential for increasing efficiency through intelligent automation processes. For this reason, it is always worth checking what positive cost effects this key measure can trigger in your own company.

But is this enough to continue improving production processes in the future? Even when the quantity and quality of machines and systems have been optimised and all potential effects of scale have been exploited to the full?

Gearing production to the dynamic ground rules of the market

It is to be expected that highly efficient, intelligent automation solutions will play a pivotal role in future production environments. Anyone failing to exploit this potential in time will almost certainly be quickly squeezed out of the market. Furthermore, new ground rules that are considerably more dynamic apply in the digital world. In order to stand out from the competition, one thing is more important than anything else: companies must have production facilities that can adapt quickly to changing general conditions. It makes no difference whether these arise from disruptive new business models, technological development, the trend towards customisation or attractive jobs in times of demographic change.

Focusing on the versatility of the company

In the future, companies must be able to adapt not only their technical infrastructure and supply chain quickly to new market conditions, but also their business models, the nature of their customer relationships, their customer support services and the availability of essential resources — in the worst case, all at once and under enormous time pressure. Companies that have already integrated a continuous learning and change process into their day-to-day operations and are therefore characterised by a high degree of versatility are at a clear advantage in these change processes.

Overcoming a one-dimensional focus on efficiency

In order to identify the key factors that are relevant for the successful production of the future, decision-makers need to realise that the one-dimensional focus on the conventional factor of 'efficiency' will not bear sustainable fruit. This is because no matter how efficient a company is, it needs to remain open to change, regularly review operations and take a critical look at standpoints that have always gone unchallenged.

This, in turn, requires a holistic approach that takes into account the complexity of the world in the aftermath of the Fourth Industrial Revolution. Successful companies will be able to respond to technical innovations, societal developments and global factors such as climate change and scarcity of resources to an unprecedented extent and faster than ever before.

Analysing megatrends

Exact predictions of the future are simply not possible. Nevertheless, in the field of innovation management, the analysis of megatrends has become an established tool for predicting future developments. Megatrends enable prognoses that can be used to derive reliable forecasts of market developments and the resulting requirements for your own company.

Figure 1: The aim of mass customisation is to produce customised product at a cost similar to mass production. Source: KUKA AG.

The megatrend of demographic change — the workforce of the future

Since humans are indispensable as the driving force in production, companies will have to master two tasks in the future. The first of these is to promote the health, skills and motivation of the existing workforce. The other is to facilitate the integration of young employees into complex production processes. Here companies must position themselves as attractive employers — with holistic production systems. Intelligent automation solutions have a valuable contribution to make in creating an appealing working environment and preventing personnel shortages.

Countering demographic change with robotics and automation

If the average age of people working in production increases, it will become all the more important to automate strenuous, hazardous or harmful tasks completely or to provide long-term relief with robots assisting human employees by means of direct interaction. Robotics and automation can take on repetitive tasks in particular, thereby alleviating the shortage of skilled labour in many production processes.

The megatrend of digitalisation — multiplication of possibilities

The collection, analysis and saving of data in real time is rapidly changing industrial processes. Digital twins, cloud and big data are increasingly determining the lifecycle of products — from development and manufacturing through to maintenance. Companies need to recognise the fact that the megatrend 'digitalisation' has triggered the greatest evolutionary leap forward in decades — and this impact is increasingly affecting production.

Digitalisation is a socio-technical transformation process

Digitalisation must not be reduced to a merely technical phenomenon. It is a socio-technical transformation process that will change our society in virtually all areas of life, resulting in a whole new level of complexity. Companies with a vision for the future are drawing two important conclusions from the megatrend of digitalisation.

1. **Ecosystem-based action:** In an age of digitalisation, only companies that see themselves belonging to different ecosystems and embrace a global community will be successful. Such a community offers internal and external connectivity, multiplies interfaces to relevant developers, suppliers and innovators. It helps to intensively maintain and benefit from a global, cross-sector network.
2. **Fusion of humans and technology:** Only companies that see humans and machines as partners whose respective strengths complement one another are in a position to recognise technological potential and leverage it to the full. In order to ensure a fusion of human abilities and technology, however, companies must increasingly invest in the integration of efficient human-machine interfaces.

The megatrend of customisation — rediscovering the individual

The new variety of life philosophies is resulting in greater individualisation, which in turn is fundamentally changing consumer behaviour. Driven by rapid technological transformation and global networking, the megatrend of customisation is affecting the requirements on manufacturing companies worldwide.

The trend is making one thing clear: the more deeply users' personal identities are anchored in products, the more intensively they identify with the products. Consequently, products must give users the feeling that they were made especially for them. However, personalised production is characterised by changes in special features. The optimal batch size in customised production, assuming products are perfectly adapted to customer requirements, is 1. The challenge will be to implement this ideal in the context of high-yield industrial production.

Successfully and cost-effectively implementing a batch size of 1

In most industries, batch size 1 production at anything approaching series-production costs is virtually impossible at present. The objective in customised mass production is to maintain overall plant effectiveness. The challenge here lies in preventing performance and quality from declining in comparison with series production.

In order to be able to satisfy this trend towards customised products, companies must integrate intelligent automation solutions into their production. These will enable more versatile production that can be networked throughout the entire process chain. On this basis, the system can automatically be converted to changing product types — without wait times and without production downtime.

The megatrend of resource scarcity — dawn of a new economic philosophy

The shortage of minerals, metals and fossil raw materials is already driving home to us the fact that our current consumer behaviour is at its limits. The shortage of resources is making raw materials more expensive, necessitating long-term changes to production processes and leading to a reappraisal of the values of global societies. From normative regulations such as legislation on plastics and emission limits to new ethical customer preferences — the scarcity

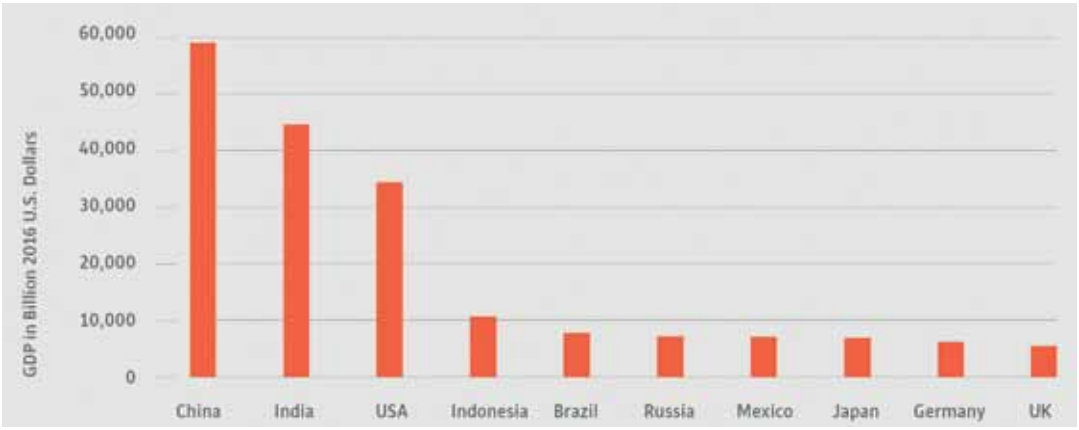

Figure 2: Top 10 countries projected to have the highest GDP in 2050. Source: PWC.

of resources is permanently changing the way companies think and act.

Maximising energy and resource efficiency in production

For many manufacturing industries, material costs represent a major cost block. The reduction of material usage and the search for cheaper, alternative raw materials are thus of central economic importance.

Companies that want to prevail in the production of the future will have to integrate flexible technologies that use resources efficiently. This will be enabled by the use of intelligent automation solutions that optimally serve all production processes precisely and efficiently, and thus with a minimised impact on resources.

The megatrend of shifting economic power — the consequences of volatile market fluctuation

The production of the future must adopt a more global outlook — with globally networked production locations and supply chains. The shifting and distribution of economic power over more countries and regions goes hand in hand with new customer requirements and new rules for production.

In order to cater to specific regional customer requirements in an economical and timely manner, global production locations are often indispensable — if for no other reason than to eliminate long transport times and high customs duties. Group standards must be introduced and monitored globally. Moreover, they should be highly adaptable to specific regional, economic, technical and cultural circumstances.

Redesigning production processes

The megatrends are overarching indicators of the global challenges facing companies today and in the future. They provide clear indications of the issues that the business sector will have to translate into concrete strategies for the future, and there are three key factors that are already deciding future success.

Key factor 1: People

The key factor 'people' will play a central role in tomorrow's technology-based production because of their flexibility and creativity: as creative elements, as knowledge repositories, as production workers and as consumers. After all, it is people who are creating these new opportunities of flexible production. One thing that will be important for the production environments of the future is that with intelligent production technologies, we can significantly enhance the capabilities of our production employees and they themselves can become even more efficient. Smart technologies support people and open up new ways of working and exploring new applications, thereby enabling more efficient manufacturing with higher quality and improved ergonomics.

Key factor 2: Technology

The key factor 'technology' constitutes the basis for sustainable production environments. Groundbreaking, flexible production technologies, such as robotic manufacturing lines, matrix production and mobile platforms, are creating a wide range of new production applications.

On the one hand, increased use of adaptable production machines such as CNC machines, 3D printers or robotic systems can help companies react to new production requirements. On the other hand, it is not until operational technology (OT) is combined with information technology (IT) that the existing boundaries of production systems are radically pushed back, utilising IT-driven developments, such as artificial intelligence, big data and cloud platforms.

Key factor 3: Adaptation

The key factor 'adaptation' describes the ability to adjust existing processes, systems and applications quickly and systematically to permanently changing requirements and market developments. This is a factor without which economic success is inconceivable in a continuously changing world.

Open interfaces, ecosystems and high-performance development kits for third-party suppliers are the key to disruptive product innovations. Companies that wish to position themselves in the production environment of the future must work with a flexible, adaptive innovation culture that leaves all paths open to them — from the development of their own innovations to the purchase of new, pioneering technologies. The environment in which future-oriented companies operate is greater than the sum of its parts. This is because the more complex a system is, the more open and varied the perspectives must be.

In order to stay up to date, entrepreneurs should also invest in production facilities with open interfaces and standards as well as correspondingly large developer communities. However, when doing so, the issue of safety and security must be taken into consideration. It is important to address both the safety of the production process and the security of the software, and to integrate corresponding concepts for safe operation of the systems.

The new formula for success

The combination of the three key factors 'people', 'technology' and 'adaptation' forms the basis of future production environments. Together, they provide the formula for success that can empower companies to design sustainable production worlds. Only by using all three factors in a targeted manner is it possible to set up a secure, flexible infrastructure that will be able to meet the requirements of the future in terms of dynamic performance and flexibility.

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Collaboration improves bovine serum albumin yield

Bill Vanderaa of Bürkert and Rowan Whittaker of Bovogen.

Established in 2001 in Melbourne, Bovogen Biologicals commenced manufacturing bovine serum albumin (BSA) on a commercial scale in 2003. In addition to manufacturing high-quality BSA and other novel proteins, Bovogen has grown to become a major supplier of sterile filtered specialty animal serums.

An acquisition by ANZCO Foods (New Zealand) in 2016 created new opportunities for Bovogen. It enabled the company access to large volumes and consistent supply of high-quality controlled and tested raw materials (serum and plasma), coupled with vertically integrated real-time traceability of materials.

BSA is the major protein species found in bovine blood plasma and has applications in life science disciplines such as cell culture, in vitro diagnostics, human and veterinary pharmaceutical manufacture, vaccine development, viral transfer medium, molecular biology, serology and general research. The largest-selling protein manufactured by Bovogen is its premium BSA, Bovostar, which is used worldwide for these areas of science.

Central to the production of BSA is the separation of the blood plasma using centrifuges. Centrifugation is a process used to separate the particles or the concentrated material, such as the cell, subcellular organelle, viruses and large molecules (including proteins and nucleic acids), to obtain pure samples of the entire particle or material. Bovogen uses two centrifuges to separate the plasma, with one fraction then processed further to purify the protein.

In 2018, Bürkert supplied and commissioned a control system with PID loop control to manage the inlet flow to the centrifuges. The application included a standalone PLC/HMI control system for two centrifuges, including hygienic modulating Bürkert 2380 bellow control valves with ELEMENT 8693 process controllers in conjunction with 8056 sanitary magnetic flowmeters for closed-loop process control.

The 2/2-way 2380 bellow control valve is a pneumatically operated process valve with a single-acting diaphragm actuator. A PTFE bellow ensures the separation between medium and actuator, and the design of the media space allows the valve to be used under hygienic or aggressive conditions. The compact, lightweight and CIP/SIPcapable valve is useful for demanding control tasks with low-flow rates, for which diaphragm valves are not suitable.

This initial control system was built to improve the monitoring and control over process flow rates and speed of production in support of Bovogen seeking improvements in yield.

"There has been an ever-increasing demand for high-quality proteins to support the sciences they are used for," said Matthew Bartlett, General Manager at Bovogen. "Bürkert's support and devices were key to improving the Bovogen centrifuge application process — with the right equipment and smart automation controls — enabling ongoing production while ensuring a consistently high quality of product."

At the output of the centrifuges, a needle valve was being used to match the output flow rate to the input flow rate, to manage any backpressure that may occur. Fluctuations in the inlet flow rate can lead to changes in backpressure resulting in unwanted bubbles, and sometimes leakage from the centrifuge.

In order to limit the likelihood of backpressure leaks, Bovogen operators had to continually monitor the pressure and adjust the outlet valve. Leakage has been known to cause product loss of around 6 – 8%.

In 2021, Bürkert was engaged to provide automation of the outlet flow rate, so that the manual intervention of operators would not be necessary to prevent product leakage. Adding control of the outlet pressure and flow, synchronised with inlet flow variations, allows the overall pressure of the system to be regulated, eliminating leaks.

The backpressure system provided by Bürkert again utilised closed-loop process control with the 2380 hygienic bellow valves with ELEMENT 8693 process controllers in conjunction with 8325 sanitary pressure sensors.

The application of automated control over both inlet and outlet flow rate has successfully achieved Bovogen's objective of reducing protein loss and increasing batch yield of BSA.

"The backpressure system is working flawlessly and my team is very pleased with the result," said Rowan Whittaker, Production Manager.

As a result of the new closed-loop centrifuge flow control, Bovogen is now successfully reducing waste, while improving production efficiency and yield.

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It offers versatility, that no other temperature calibrator can match.

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Drive In A Box is a complete turnkey drive solution from Control Logic, designed to the highest engineering standards, using globally recognised brands including ABB. This pre-wired solution is tested with RPEQ Certification to help ensure optimal quality and reliability. It can support a wide range of applications, up to 250 kW and is available in both general-purpose and water-specific drive configurations.

Designed to be installed in harsh industrial environments, the robust cabinet design includes an ingress protection rating of IP55 and can be installed in direct sunlight. In addition to meeting the specifications of the drive, the enclosures are compact in size.

Drive in a Box offers a variety of optional extras, allowing customisation based on the requirements of the application. Equipment protection is available with pre-fitted surge diverters and circuit breakers to provide a safeguard from over-voltage and lightning strikes. It can be provided with a thermostat, allowing for easy monitoring of the enclosure's air temperature.

Drive in a Box can also be implemented with control wiring pre-terminated to terminals, which can avoid messy wiring and reduce installation time. For the IP55-rated cabinet, in extreme environments a sun hat and rain shield are available extras. It also offers the option of start/stop switches, indication lamps, speed control potentiometer and variable speed drive control panel to operate the drive without opening the enclosure.

Control Logic Pty Ltd
www.controllogic.com.au

CONTROLLER PROGRAMMING UPDATE

Rockwell Automation has announced Studio 5000 Logix Designer version 34, which allows support for the latest hardware, while giving users an improved download and online experience that enhances the export of project-simultaneous activity.

Portfolio alignment with FactoryTalk Linx and CIP Security aligns with the combined developments and applications in the latest version. Developments in the FactoryTalk Linx platform provide an opportunity to reduce unproductive time and improve system efficiency. CIP Security is now supported in standard and safety platforms, including ControlLogix 5580 controllers, GuardLogix 5580 controllers, Compact-Logix 5380 controllers and Compact GuardLogix 5380 controllers.

Productivity enhancements like improved down-load performance are said to be the largest im-provement. In coordination between Logix Designer application development and FactoryTalk Linx, users will notice that the reduction of download times is significant. These online enhancements are delivered by combined advances in Studio 5000 Logix Designer V34 and FactoryTalk Linx 6.30. Additionally, online import and export of project activity, including comments and documentation made by others without first going offline with the controller, are now available.

V34 also adds new data types configured as Time types. Created Time data types reduce the manual formatting of integers or Add-On Instructions to represent time and allow rapid and repeatable formats for time in projects.

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For systems with large I/O needs, the 2-slot CPU can also be expanded with up to eight additional stackable I/O modules for up to 156 discrete I/O or 60 analog I/O points in total. Numerous stackable modules are available, offering discrete, relay, analog, temperature and combination I/O.

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ROTATIONAL ENERGY SUPPLY SYSTEM

In addition to slip rings, rotary energy supply systems are often used to rotate cables and hoses safely through 360°.

Specifically for tight rotational movements in cables and hoses, igus has developed the PRM (Polymer Rotation Module) energy supply system consisting of a polymer energy chain and a low-friction plastic guide trough. Previous models used a steel channel, which was a major cost factor, especially in smaller applications.

The PRM utilises wear-resistant, durable, high-performance plastics. The result is a system that costs up to 73% less and is up to 85% lighter than a steel trough, the company claims. An additional advantage of a plastic trough is protection against corrosion.

Rotary energy supply systems score particularly well against slip rings because the cables have a defined movement, and several forms of media can be guided at the same time. The chain can be adjusted at any time and cables can be quickly replaced during maintenance. The system is available in outer diameters ranging from 200 to 500 mm as a complete set. Users can also deploy ready-made kits for linear travels of 8 to 200 m.

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UNDERSTANDING FIREWALL TECHNOLOGY FOR INDUSTRIAL CYBERSECURITY

PART 1

*Dr Tobias Heer, Dr Oliver Kleineberg and Divij Agarwal, Belden**

Firewalls are essential components for ensuring network security and increasing system robustness and resiliency.

Firewalls represent an indispensable tool for network security. As industrial systems have adopted Ethernet infrastructure and become interconnected to corporate IT systems, firewalls have become essential components for ensuring network security and increasing system robustness and resiliency. Rather than being a one-size-fits-all device, firewalls come in a variety of form factors with a range of features and technologies optimised to play different roles as part of a comprehensive security architecture.

An essential component of industrial network security

Modern security models adopt a holistic approach, taking into consideration not only technology but also the processes and people involved. This is why it has been a long time since firewalls alone have been promoted as a sufficient or exclusive measure for securing industrial plants and networks. Firewalls are, however, the core elements in network segmentation and therefore are an essential part of any network security strategy.[1]

Over time, the term 'firewall' has come to be very widely used and now applies to a broad range of technologies with different methods of operation and objectives. Today, the diverse firewall array includes: stateless and stateful firewalls, transparent firewalls, firewalls at various levels of the network reference architectures, firewalls with deep packet inspection and even firewalls with intrusion detection features. Then there are additional methods that can control and limit network traffic, such as access control lists. This leaves the system designer with the question of which type of firewall is appropriate for which use case.

General function of a firewall

Firewalls are devices that protect networks or network devices, such as industrial PCs, control systems, cameras and other devices from unauthorised access by preventing network traffic to or from

> INDUSTRY STUDIES HAVE SHOWN THAT MOST CYBER INCIDENTS ARE NOT DUE TO INTENTIONAL EXTERNAL ATTACKS BUT FROM SOFTWARE OR DEVICE FAILURES AND HUMAN ERROR.

these systems. The first broad distinction here is the difference between host firewalls and network firewalls. The first is installed on a computer (host) or already provided by the operating system as a software feature. Examples of these personal firewalls are the Windows system firewall or the iptables firewall, which is part of most Linux systems.

In contrast to that, network firewalls are specifically developed for use as a firewall and are placed in the network rather than on a PC. These network, or hardware, firewalls are important elements in industrial facilities, especially when they are connected to additional networks (such as office networks) or when wired transmissions are combined with wireless technologies. In these situations, a network firewall serves to establish the network boundary as the first line of defence against attacks and only allows desired traffic into and out of the network.

The fundamental technical function of any firewall is to filter packets. The firewall inspects each packet it receives to determine whether the packet corresponds to a desired template for traffic patterns. The firewall then filters (drops or discards) or forwards packets that match these templates. These templates are modelled in the form of rules. A firewall at the boundary of a network can, for example, include rules in the form of "A communication link within the network can only take place with a specified server" or "Only the PCs for remote maintenance can be reached outside the network, not any other devices." A firewall protecting an operational zone of a plant floor might contain rules for industrial protocols, eg, Modbus/TCP, such as "Write commands for the Modbus/TCP protocol, coil 56, are permitted only from the maintenance terminal."

Because network-based firewalls are of great significance for industrial facilities, this article focuses on those alone. But where are these firewalls used in today's security models?

Firewalls in an industrial environment: applications and requirements

Firewalls are important components in today's security strategies. Different types of firewalls are used in various locations within the network to provide different types of protection as part of a defence in depth[2] strategy. Firewalls can secure the link between a company network and the industrial network to protect against external hacker attacks. Other types of firewalls separate devices within a network from each other, or permit only specified communications between devices to protect not only against malicious attack but also against device or operator error. The concept of precisely limiting communication between participants in internal networks, as well as partitioning of various network areas from each other, is known as zones and conduits. Zones and conduits are a central component of the international standard IEC 62443 and a key component of a defence in depth security strategy.

Defence in depth is a strategy where multiple layers of defence are implemented, in contrast to just one defence mechanism, a single firewall, for example. The reason why defence in depth and zones and conduits go together so well is that key elements of both strategies complement each other.

On one hand, defence in depth hampers attacks against networks through a set of layered defences — an attacker must defeat multiple security levels, not just a single obstacle. On the other hand, partitioning a network into multiple communication zones and implementing a 'need to communicate' strategy according to zones and conduits implicitly adds additional defence

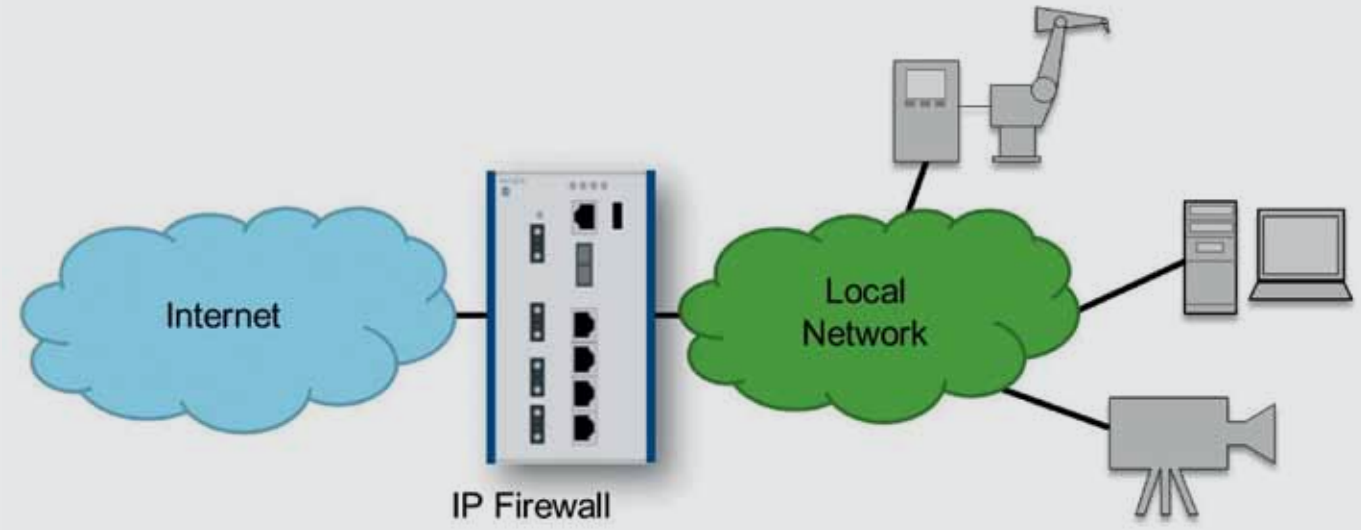

Figure 1: Firewall between the Internet and the local company network.

layers — layers that add to the resilience of the network in the case that one of the areas is compromised by an attacker. In this case, only the partitioned area that the attacker has been able to reach is compromised; the remainder of the network is protected. And, because the bulk of cyber incidents are related to device failure, software error, human error or malware, zones and conduits increase system reliability and robustness by keeping incidents in one zone from spreading to another.

The strategies of defence in depth and zones and conduits are not new. If you look at castle construction from any culture, you will see that layers of security were built into the castle design — moats, multiple walls, turrets. Individual zones of the castle are separated from each other by controlled conduits — gates, drawbridges and iron bars — to contain attackers and make their movements more difficult.

In communication networks, the isolation of groups of networked devices into zones and conduits represents the gates. This procedure should be applied in combination with a stacked defence in depth since gates are useless without walls. In order to implement these best practices in communication networks, numerous firewalls are used at various locations in the network.

Firewalls at network boundaries

Firewalls play various roles in partitioning networks. Firewalls can be used to protect a company's enterprise networks against threats from the outside. In this case, this overall protection is the domain of IT firewall solutions that are placed in a company's data centre. Firewalls can also be used to protect networks from each other; for example, to separate a production network from the company's enterprise network.

A firewall in a small cell or external site

Industrial firewalls with router functions are perfect for smaller external sites. This allows, for example, distribution stations or remote work sites to be connected to the rest of the company's control infrastructure via a cellular network. The firewall controls the flow of network traffic out of and into the external site's local network. Because such a firewall represents the border between the company's own network (the external site) and an external network (a provider network or the internet), the firewall must possess full capabilities for packet filtering and filtering traffic between various networks (see Figure 1). Such a firewall is called an IP firewall since it processes Internet Protocol (IP) traffic. Because these firewalls are often installed very near the actual facility, industrial hardening must also be taken into consideration. Extended temperature ranges or approval for use in special areas (such as energy supply, hazardous location and transportation) are crucial.

> THE DEMANDS PUT ON A FIREWALL IN USE WITHIN A NETWORK DIFFER FROM THE DEMANDS PUT ON A FIREWALL IN USE BETWEEN NETWORKS.

Firewalls at the field level

It is rarely sufficient to protect only the external boundaries of the network against attackers. Many threats actually originate inside a network. Industry studies have shown that most cyber incidents are not due to intentional external attacks but from software or device failures and human error. In a networked control system, errors and mistakes can quickly propagate within the system unless proper design steps are undertaken to isolate and contain failures. Thus, an effective cybersecurity strategy is not just about security but is also an important component of ensuring the safety, resiliency and reliability of your system.

In this case, firewalls can contribute to the overall resiliency against unintentional errors by limiting communication between different zones of the local network (see Figure 2). This requires a firewall that is tailored to fit this particular use case. If communication from outside the facility is only supposed to be possible with a single device, the firewall should specifically permit this connection while it prevents other attempts at communication.

The demands put on a firewall in use within a network differ from the demands put on a firewall in use between networks. Therefore, a transparent Layer 2 firewall at the Ethernet level is required instead of an IP firewall. The key characteristic of a transparent Layer 2 firewall is shown in Figure 3. The Layer 2 firewall implements filtering functions on local communication,

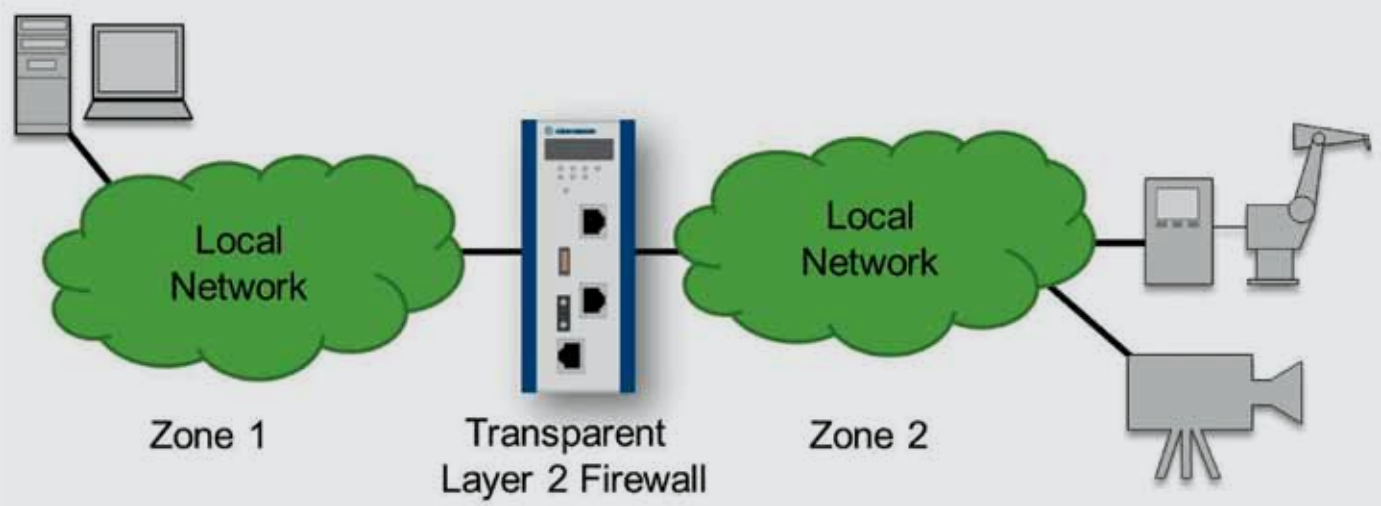

Figure 2: Firewall within a local network.

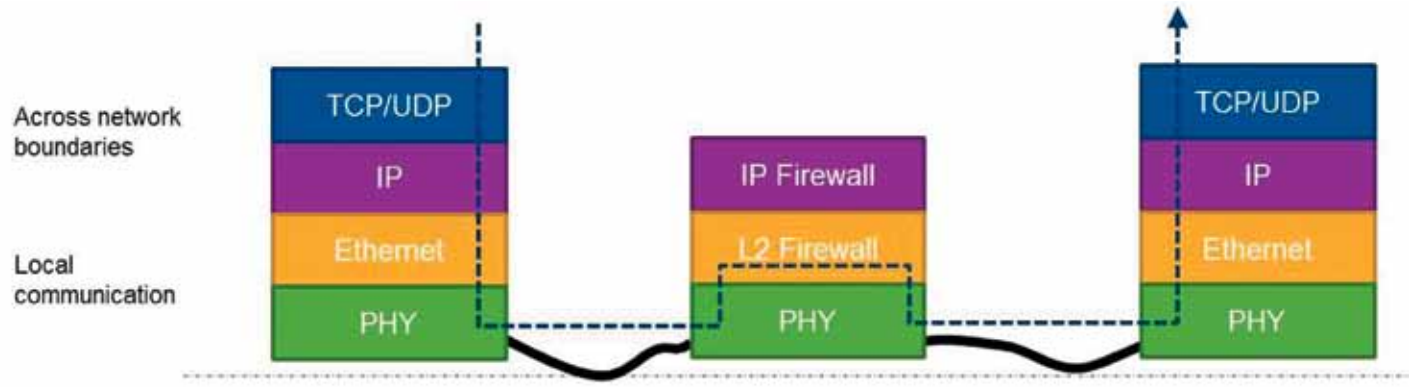

Figure 3: Layer 2 transparent firewall.

which usually happens on the Ethernet level or Layer 2 in the ISO-OSI layering model.

In contrast, pure Layer 3 firewalls are usually unaware of Layer 2 traffic. Therefore, the Layer 2 firewall is transparent to the upper protocol layers but performs a critical security function in local networks.

Due to the fact that these firewalls are usually implemented at the field level, the application parameters (temperature, vibration and other environmental factors), as well as the necessary approvals, must be taken into consideration. This results not only in significant functional differences of these devices, compared to conventional IT firewalls, but also in different outward appearance, device sizes, device housing, cooling (usually, only passive cooling is possible) as well as in supported network media and transceiver technology.

Firewalls in a WLAN

Communication from wireless to wired networks can also be controlled by firewalls. If a client is connected to a WLAN, it is possible, in principle, to communicate directly with all other devices in the same network. Thus, an attacker can extend a successful attack on a client that is connected to the WLAN to any other device on the Ethernet network.

This problem can be solved by restricting the forwarding of messages between WLAN clients with a firewall at the WLAN access point. For example, the communication of a tablet that is connected to a device via a WLAN can be limited so that it can only access data through the user interface but not additional subsystems or other devices connected to it.

In order to do this, the firewall must be implemented directly at the access point. Industrially hardened devices are important here as well.

In Part 2

In Part 2 of this article, we will examine in depth the different types of filtering available within industrial firewall devices and the ways in which multiple firewall devices can be best managed.

References

1. National Institute of Standards and Technology NIST 2009, *Guidelines on Firewalls and Firewall Policy, Revision 1.*
2. National Institute of Standards and Technology NIST 2011, *Guide to Industrial Control Systems (ICS) Security.*

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Control Logic Pty Ltd
www.controllogic.com.au

NEW PRODUCTS

MULTICODE READER

The O2I500 multicode reader from ifm is designed to be simple to use like a sensor, and detects 1D and 2D codes.

It is designed to provide reliable reading results even in difficult conditions, reading up to four different codes in milliseconds.

The one-button teach function and the viewfinder make the reader easy to configure, and it can also be configured via an app or using the ifm Vision Assistant software.

The device has an exchangeable memory stick, which can be used to save or load complete configurations. This simplifies device replacement and the set-up of several units for the same application.

The integrated optional illumination with polarisation filter provides sufficient contrast to detect codes even in the case of shiny surfaces such as metal.

ifm efector pty ltd
www.ifm.com/au

SAFETY LIGHT CURTAINS

The ELC 100 safety light curtains from Leuze represent an alternative to the company's MLC 500 series and are suitable for applications with operating ranges of up to 6 m.

The robust safety light curtains have key features for guarding machine openings and access points on machines or systems. Their resolutions of 17 and 30 mm enable them to easily detect fingers and hands. The protective field extends to the edge of the housing so that no dead zones are created during integration, and the devices are available with protective field lengths of 300 to 1500 mm. They are also designed to be resistant to shock and vibration.

Due to their 4-pin connection and supports with swivel function, the safety light curtains are quick to install. A practical feature is the multi-level alignment display, which is easy to read and can be used to quickly position the devices in the optimum alignment. The devices do not require configuration.

Leuze electronic Pty Ltd
www.leuze.com.au

DIGITAL PRESSURE GAUGE WITH SNAPSHOT LOGGING

Snapshot Logging is the latest FieldLab feature that lets users record multiple single data points and save them in one data set. Users have the option to label test points and include the time, date, target pressure or permissible error for each dataset to facilitate standard operating procedures and save each test mode so that specific tests can be easily repeated whenever necessary. It provides clear, traceable results that can be stored digitally and exported easily to a PDF or CSV file.

Users can create a Snapshot Logging test on the FieldLab desktop software that can be synced and run on a Ralston FieldLab, or a FieldLab or Field Gauge can be used and connected to a PC to log the data directly to the FieldLab Desktop.

The FieldLab digital pressure gauge with Snapshot Logging is a suitable tool for tank pressure tests, logging tyre pressure on vehicles or aircraft, testing boilers that need daily pressure measurements or any application that requires the logging of observed pressure at irregular or infrequent intervals.

Ralston Instruments LLC

www.ralstoninst.com

DECENTRALISED POWER SUPPLY

Turck's compact PSU67 power supply units are designed to provide energy-efficient, decentralised power supply in modular systems at ambient temperatures from -25 to +70°C. The units can be installed directly in the field without any protective measures, making it possible to completely dispense with switch cabinets and switch boxes. The robust PSU67 power supply units are rated to IP67, include models for 1- and 3-phase, and are available in 15, 20 or 25 A models. Suitable for applications in modular machine building, the PSU67 power supply units utilise M12, 7/8" or HAN-Q4 industrial connectivity.

The decentralised power supply units supply 24–28 VDC directly in the field at over 95% efficiency without cable run loss and offer a high level of fail safety due to their electronic no load, overload and short circuit protection. The output voltage can be configured directly on the device via an LED interface or remotely via IO-Link. The smart IO-Link interface also enables communication and provides the data transparency needed for Industry 4.0 applications, such as predictive maintenance or condition monitoring. The end-to-end transmission of process, consumption, event and diagnostic data right through to the cloud enables continuous monitoring and optimisation in the background.

Turck Australia Pty Ltd
www.turck.com.au

OPC UA I/O MODULE

The ICP DAS U-7555M is an OPC UA I/O module that provides eight digital input channels and eight digital output channels. It also has a built-in dual-port Ethernet switch to implement a daisy-chain topology.

U-7555M follows the IEEE 802.3af (Class 2) PoE specification, allowing it to receive power from PoE-enabled networks. This feature provides greater flexibility and efficiency to simplify system design, save space and reduce wiring. It also provides a web UI to configure, control and monitor the modules, connections and I/O status via a web browser.

The U-7555M provides an OPC UA server, an MQTT client and a RESTful API. Users can choose the networking mode according to the application. It also supports logic function rules (IF/THEN/ELSE) to set up logical conditions and actions for the I/O points. A schedule function makes it possible to execute the set rules at a specific time.

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

OPINION

FIGHTING THE COMMON ENEMY THROUGH OT/IT CYBERSECURITY CONVERGENCE

Much discussed in recent years, OT/IT convergence is aimed at creating a synergy that provides businesses with strategic insights that can significantly improve internal processes, business decisions, productivity and competitiveness.

However, with the spread of IT functions and technologies into OT environments — and the subsequently enhanced interconnectivity — some of the cybersecurity risks associated with IT systems can seep into OT networks. Some companies are already experiencing a systemic interdependent cyber risk between the OT and IT sides of the business.

Operational friction between OT and IT

OT and IT personnel come to the table with different agendas, with different operating procedures and roles to play. OT engineers and plant managers are all about keeping the production going, and making sure it is safe, while trying to increase productivity and output. In relation to cybersecurity, system availability is their highest concern.

The IT cybersecurity view is all about protecting the company's IP, information systems, customer data and business transactional data. In relation to cybersecurity, system confidentiality is their highest concern, over system and data availability or integrity.

As edge computing moves into the industrial environment and industrial process data is connected to external or in-house cloud technologies, the lines of responsibility for cybersecurity become blurred. Even if a company can maintain an effective air-gap between OT and IT environments (through effective firewall and edge gateway strategies for example), production and asset data is now moved into a realm where concerns of confidentiality may become more important. Conversely, traditional IT cybersecurity strategies cannot be realistically employed in OT environments, for technical and business reasons that have been described exhaustively elsewhere — and as is well recognised by every OT engineer.

Achieving a common cybersecurity viewpoint

Ultimately, it is to the benefit of both the OT and IT sides of the business that comprehensive and unified visibility of both OT and IT environments is achieved. This will give OT and IT teams the ability to isolate issues and reduce the friction involved in the activities required to mitigate cyber risk, as well as during incident response.

Even in OT systems that are still air-gapped, many still use IP-based control networks and operators still install software updates provided by the manufacturer, and will not be patched and updated regularly. This leaves open security vulnerabilities that can be exploited, typically by inadvertently introduced malware. Such infiltrations can cause costly disruptions and safety issues.

One way such risks can be mitigated is through the use of next-generation firewalls (NGFW) that can track network activity, accompanied by comprehensive cybersecurity tracking and reporting, as well as AI-powered threat intelligence.

The corporate IT infrastructure also needs a broad, integrated and automated cybersecurity technology that meets the same objectives of risk mitigation and reduced time to detection and response.

In the past, the IT side of the business has been well served by tools and techniques to achieve such goals. Similarly, over recent years the operational side of the business is also presented with many techniques and tools to achieve its cybersecurity goals, through industry standards and the support of those standards by large automation industry players.

However, as good as both the OT and IT solutions to the common cybersecurity threat are, this still leaves an OT/IT divide, with differing or disparate solutions to the problem.

A solution in common to a common problem

What is needed today, to reduce or eliminate operational OT/IT cybersecurity friction, is a way to give a comprehensive and common view of assets from a cybersecurity standpoint and a common infrastructure to respond to cyber threats. Such a common security fabric, utilising common NGFWs as well as integrated supporting software tools and threat intelligence, makes it possible to achieve broad visibility into who is on the network and what they are doing, and whether systems and devices are behaving within their normal operating parameters.

The alignment of cybersecurity risk mitigation and response strategies is key to minimising the risk associated with the alignment of business and operational goals through OT/IT integration. Only in this way can the friction between the aims of OT and IT teams be reduced, and the mean time to detection and response in the case of a cybersecurity incident be minimised.

Michael Murphy is the head of operational technology and critical infrastructure for Fortinet in Australia. His focus is on helping organisations build cyber resilience for OT and understanding how to achieve strong outcomes for OT security. Michael has held roles as a cybersecurity practitioner and senior sales engineer and has built OT incident response teams in Australia, New Zealand, London, Hong Kong and Singapore.

AVEVA PLANT SCADA 2020 R2 TAPS INTO THE FULL POTENTIAL OF THE AVEVA PORTFOLIO

As global industry accelerates plans for digital transformation and seeks reliable and flexible SCADA solutions, many companies are shifting to tightly integrated stacks of solutions to solve increasingly interconnected operational challenges.

As HMI/SCADA software continues to evolve, AVEVA Plant SCADA has grown as well. Users will find it easier than ever to explore solutions that deliver collaboration, skills management, deep analytics, and artificial intelligence. Industrial operations must reimagine traditional HMI/SCADA to support the future potential of operations control.

AVEVA Plant SCADA unlocks the full potential of integrated operations control

AVEVA is already exploring ways to bring the familiarity of traditional HMI/SCADA software to a more integrated style of operations, centred around common information platforms and unified operations. AVEVA Plant SCADA represents an example of the way legacy SCADA software can be updated to play a powerful role in unified operations while maintaining features that customers have come to rely on over decades.

AVEVA Plant SCADA began its development lifecycle as a part of Citect, and quickly gained dominance of the SCADA market in the Asia Pacific region. When Citect became part of Schneider Electric and then AVEVA, Citect SCADA was integrated with the AVEVA portfolio.

Now, the same team who created Citect SCADA provides AVEVA Plant SCADA. They've kept the features customers have come to rely on like legacy image libraries and graphics editors, but they've infused Plant SCADA with common tools shared across AVEVA's rich portfolio, like industrial graphics and a powerful read/write web client based on HTML5.

Comprehensive operations with AVEVA

AVEVA hasn't just made this trusted SCADA software better, it has made it a full part of AVEVA operations capabilities. Operations control is a framework of information and teams that allow organisations to break down operational silos and show one unified vision of operations that managers and operators can use to make better decisions and improve processes.

Plant SCADA serves an important role within operations control, and organisations using Plant SCADA can already take advantage of other powerful AVEVA solutions designed to unify systems and teams. For example, Plant SCADA supports

industrial graphics, which allows users to import and export rich graphics libraries to other systems.

AVEVA Connect is another important piece of the AVEVA operations control portfolio. Within AVEVA connect, Plant SCADA users can centralise their data with AVEVA Data Hub or use AVEVA Insight to understand their asset health and performance.

AVEVA Plant SCADA is also a part of AVEVA Flex, a subscription credits system that allows AVEVA's customers to use the entire AVEVA operations portfolio with much lower upfront costs. Want to use FLEX to augment Plant SCADA with the edge management solutions of AVEVA Edge? Now you can! Want to bring Plant SCADA data directly into a unified operations centre? AVEVA Flex makes it possible and cost-effective to start experimenting with more complex system architectures and take advantage of powerful automation tools.

AVEVA Select Distributors offer a personal touch

As an AVEVA Select Distributor, Schneider Electric offers the full AVEVA portfolio. This allows it to provide a personal touchpoint for companies executing their digital transformation plans as they explore new ways to structure their teams and break down information silos for a more unified experience of operations.

Schneider Electric's partnership with AVEVA provides a rich set of solutions that help organisations optimise operations and asset performance, and more easily adopt technologies like artificial intelligence, industrial IoT, big data, cloud, and hybrid-cloud capabilities.

Upgrading to AVEVA Plant SCADA

AVEVA and Schneider Electric always recommend the use of the most recent versions of software to mitigate security risks and implement the latest features and capabilities. If the organisation is currently using a legacy edition of Citect SCADA, updating to AVEVA Plant SCADA will provide the future-ready technology needed to stay competitive.

Never used AVEVA Plant SCADA? Contact our team to request a demo so we can demonstrate how to reduce your operating costs and improve productivity and product quality.

Schneider Electric
se.com/au/getreadyformore

THE LIGHTS-SPARSE VERSUS THE LIGHTS-OUT FACTORY

PART 1

The concept of a 'lights-out' factory — one in which the requirements for human activity are so minimal that the facility can operate in the dark — has been around for decades, but the digital and automation technologies needed to make it a reality at scale are just now maturing. At the same time, new market trends and perennial issues like questions about labour versus automation are making the realisation of the lights-out factory that much more challenging. Widespread deployment of lights-out factories globally across industries may be years or decades away, but forward-looking manufacturers may seize opportunities today to implement lights-out processes within their conventional and smart factories — making for a 'lights-sparse' facility or production line.

'Lights-out' concepts and real-world manufacturing

The global manufacturing community has long been intrigued by the notional concept of a completely self-sufficient factory in which the only human interactions are the placing of orders and receipt of finished products. Although this blue-sky version is unlikely to completely materialise on a large scale in the near term, it is reasonable to ask which concepts behind autonomous manufacturing might come to fruition. Importantly, any realisation of these concepts must move beyond novelty and prove truly beneficial to manufacturers — improving productivity, quality, sustainability, consistency, safety, profits and certainty. According to a Gartner study, by 2025, 60% of manufacturers will have more than two completely lights-out processes in at least one of their facilities. It is an ambitious expectation for lights-out production.

The lights-out factory or 'dark factory' made its way from the pages of science fiction (first popularised in the 1955 short story *Autofac*, by US author Philip K Dick) to the floors of actual manufacturing facilities in the latter half of the twentieth century. Called lights-out factories because they require so little human intervention that they can operate in the dark, such facilities were attempted in earnest beginning in the 1980s. These early efforts were unsuccessful, but several success stories beginning in 2001 have been widely publicised and discussed. Perhaps the most well known is the FANUC factory in Japan that uses robots to build robots, with no human intervention reportedly for a month or more.

FANUC and other manufacturing companies have demonstrated that the lights-out factory is both possible and profitable — for their

particular applications. The question remains whether it makes sense for your company to build or convert to a lights-out factory, or more likely, convert certain processes within your facility to run lights-out.

For the foreseeable future, converting or building a factory for comprehensive lights-out operation depends on several factors and could become a costly endeavour. A complete lights-out factory must be outfitted with automated guided vehicles (AGVs) and the factory floor infrastructure and floor plan that support them; self-loading and unloading production equipment or robots to complete each of the production steps; self-configuring machines such as CNC machine tools and robots that change out their own end effectors; modular production stations that can be automatically resequenced depending on the particular product being manufactured; vision or other non-destructive automated systems for real-time quality inspections; reconfigurable conveyor belts; pick-and-place machines; advanced networks like 5G; sensors, sensors and more sensors; and perhaps most critical of all, the digital infrastructure and control software capable of scheduling and orchestrating the entirety of the production process, from receipt of raw materials and supplier-made components (which must be quality verified) to packaging and loading finished products onto delivery vehicles.

Traditionally, the type of manufacturing that lends itself to this type of factory is mass production on a fixed schedule. The smaller the lot or batch size a factory is producing, or the more frequently it is required to make new or modified products, the perception is that it is less likely to be a good candidate for full lights-out operation. Automation and digital manufacturing technologies can create this reality but must be incremental to reap the benefits (especially in brownfield facilities where large capital investments are already in place).

It is frequently noted that human beings are the most flexible of production resources. Human intervention remains the most efficient and economical way to implement production changes in a significant majority of manufacturing cases. Today, this human activity is supported by data-generated actionable insights and advanced technologies such as autonomous mobile robots, collaborative robots, edge computing and artificial intelligence/machine learning. Human-supported lights-sparse production, in which specific operations within the process are conducted at crewless locations within the factory or remotely outside the factory, is a scenario that could make the most of human, digital and automated resources.

Given the challenges of a fully automated factory for most manufacturing endeavours, what makes sense for a much larger segment of manufacturers is to identify specific processes or areas within a facility, or specific blocks of time during production, when crewless operation is both feasible and valuable.

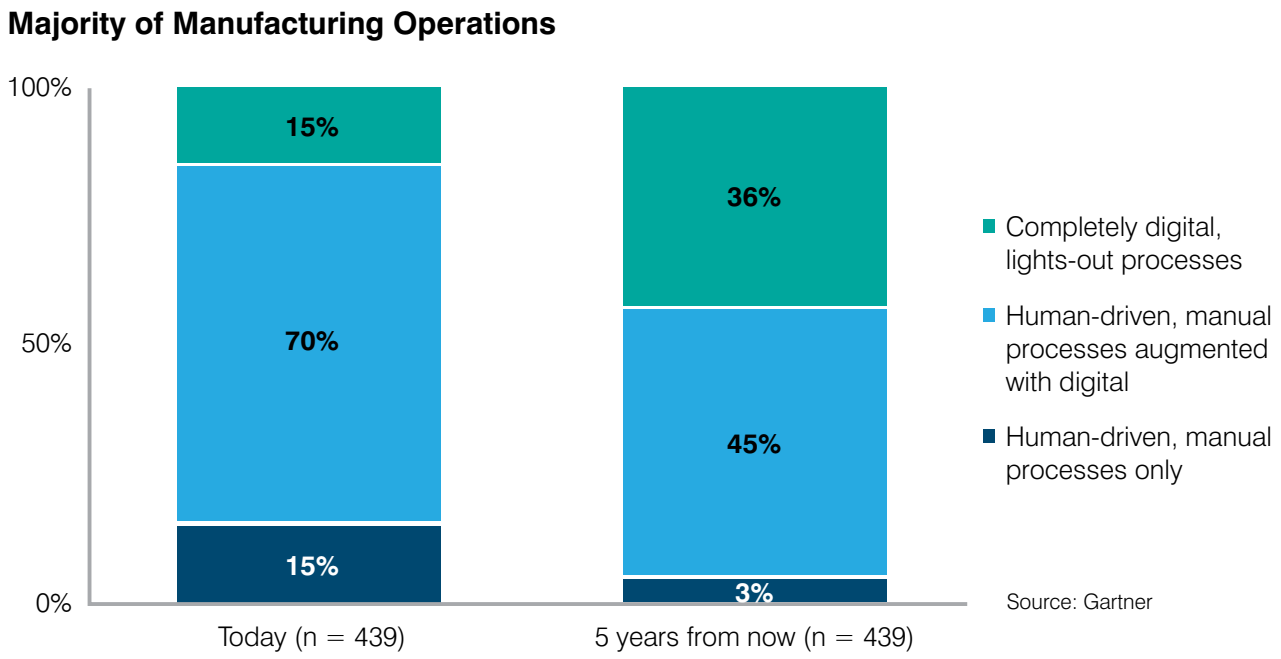
Rather than targeting a complete lights-out factory, most manufacturers are better served to start with lights-sparse manufacturing within their otherwise conventional or smart factory.

At the same time, some manufacturers may want to consider the recently trending concept of the microfactory, with new business models of subscriptions (instead of upfront capital investments) — a small, highly automated manufacturing space that requires a smaller labour force and uses far less energy and materials than a conventional factory. An agile microfactory is capable of high-mix, low-volume business with low cost and high ROI.

These microfactories have the advantage of embracing digital tools from the very beginning. But easy and cost-effective digital technology can be leveraged both by contract manufacturers setting up microfactories (which are small-scale by their very nature) and by corporations with centralised design and geographically dispersed manufacturing — and for that matter, by manufacturers whose operations fall somewhere in between these two models.

Lights-out: new opportunities but also new challenges

Before delving into the means of implementing lights-out manufacturing, it is important to understand the goal — the value of lights-out operations to the manufacturer. Obviously, for a cost-



Base: Excludes "Don't know" responses
Q. What best describes the majority of your manufacturing operations today?
Q. And think about five years from now, what do you anticipate your manufacturing operations will look like?
Source: 2020 Gartner Smart Manufacturing Strategy and Implementation Trends Survey

Figure 1: Ambitious expectations for lights-out production in 2025.

benefit analysis to weigh in favour of lights-out implementation, the benefits must extend well beyond savings on the utility bill and lightbulb purchases. Examples of some of the benefits enjoyed by those implementing lights-out manufacturing or processes include:

- **Reduced labour costs:** An example of a full lights-out factory, the Chinese e-commerce company JD.com operates a 3700 m^2 lights-out warehouse with 20 robots and five technicians instead of the 500 workers a non-robotic operation would require. Implementing lights-out manufacturing in select areas of a factory would also reduce labour costs, just on a smaller scale.
- **Less reliance on a labour force:** In some parts of the world and in certain industries there are more jobs than there are workers with the requisite skills to perform them. When lights-out manufacturing takes over tedious, repetitive tasks, workers can be trained and reassigned to those tasks better handled with the flexibility and creativity human beings offer.
- **Reduced error rates:** Machines are simply better than human workers at performing repetitive tasks consistently. Machines never get fatigued or distracted, and they perform tasks with very little variation for long stretches.
- **Material management efficiencies:** The application of lights-out technologies to the movement of materials has the potential to shorten dwell time between steps as well as replenishment time. The result is reduced inventory costs and higher production rates.
- **Accelerated product lifecycles:** Lights-out operations have the potential for accelerated transitions from design to producing the finished goods. Lights-out machinery can be designed to receive digital product design and processing information, self-configure and begin production operations much more rapidly than attended machinery.

On the other side of a cost-benefit analysis is the lifecycle of automated equipment and end-of-life disposition towards sustainability. Once automated systems become obsolete or break down beyond repair, what happens to them? In a world pursuing sustainability and working towards a circular economy, manufacturers must consider whether automated equipment enables 'reduce, re-use, recycle' benefits while in use, and whether retired equipment can be re-used or recycled itself. Greenfield factories and microfactories can be designed from the very beginning with sustainability taken into consideration.

Enabling technologies

Enabling a lights-sparse facility to be considered today, since a number of technologies have gained capabilities essential to lights-out manufacturing.

Robotics

Robotics has advanced on numerous fronts, including synchronisation with machines and work-in-progress components, increased range of motion, new gripping technology and much more. In addition to autonomous robots, advancements in cobots do not eliminate human labour, but they make workers more efficient and productive, potentially reducing the number of workers needed on the production floor.

Processing innovations

Process innovations such as 3D printing and other additive manufacturing (AM) techniques, plus hybrid manufacturing technologies that combine additive techniques with fully automated computer numerical control (CNC) equipment, make net-shape or near-net-shape production of components and products possible, with process steps guided through a direct interface with the digital factory.

> RATHER THAN TARGETING A COMPLETE LIGHTS-OUT FACTORY, MOST MANUFACTURERS ARE BETTER SERVED TO START WITH LIGHTS-SPARSE MANUFACTURING WITHIN THEIR OTHERWISE CONVENTIONAL OR SMART FACTORY.

Additive manufacturing often begins with a high degree of automation and a reduced number of production steps or production stations — making it more amenable to lights-out operation than some conventional manufacturing operations.

Operational technology

Operational technology (OT) such as PLCs, edge devices, drivers, sensors, 5G and the IIoT offer accelerated processing speeds that enable automation equipment to rapidly respond to manufacturing conditions. Unattended machines can therefore initiate, proceed, adjust and stop operations that previously required human intervention. Critical enabling technology is the 5G mobile wireless communication standard, which is able to support a wireless data infrastructure within the factory.

Enhanced data-driven operational orchestration technology opens the door to reduced human intervention at the production line. A centralised orchestration control room with a multi-experience user interface, for example, may empower a single operator to oversee multiple machine operations, possibly from a remote location. Conversely, distributed user access to a centralised digital platform means that any authorised stake-holder can remotely access in a secure way the operational insights for decisive actions about any dark process in the manufacturer's facility.

Virtual commissioning

Virtual commissioning also enables debugging of automation control logic and PLC code in a virtual environment before download to real equipment. The associated simulation and virtual validation help confirm that automation equipment will work as expected in autonomous mode.

AI and ML

Artificial intelligence/machine learning enables machines not only to learn process steps but also to improve performance, so that productivity and quality are both enhanced without human intervention.

Extended reality

Extended reality (XR) technologies, including virtual reality (VR) and augmented reality (AR), enable manufacturers to reduce the tasks an operator must accomplish, and the time spent doing them at the production line.

In Part 2

In Part 2 of this article, the challenges of achieving lights-out or lights-sparse manufacturing will be discussed, along with the digitalisation technology required to achieve them.

Siemens Ltd
www.siemens.com.au

MASS FLOW METER AND CONTROLLER

The FLEXI-FLOW mass flow meter and controller from Bronkhorst combines the advantages of a through-chip-sensor with bypass technology. The company says the compact thermal mass flow meters and controllers are 35% smaller than traditional instruments, and offer flow ranges up to 20 ln/min.

Due to the sensing technique, the instruments feature stable but fast flow control, with settling times smaller than 150 ms.

FLEXI-FLOW instruments have integrated temperature and pressure sensors and an onboard gas database for high accuracy, even in varying process conditions. With this technology, the instruments are adaptable to many applications through their wide dynamic flow ranges (up to 1:1000). The temperature and pressure signals may provide the user with information about the actual process conditions.

For easy set-up and monitoring of the instruments and the process, Bronkhorst has introduced a USB-C port, optional Bluetooth communication and NAMUR status indication by means of coloured LEDs and digital output parameters. FLEXI-FLOW is available in two preconfigured models, as a built-to-order version or as a customised, multi-channel solution, each including software tools for configuration, diagnostics and predictive maintenance.

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

IICA GLADSTONE TECHNOLOGY EXPO

THURSDAY, 28 JULY 2022

The Institute of Instrumentation, Control and Automation runs expos all around Australia and is excited to be back in Gladstone this year.

The IICA Gladstone Technology Expo will be held on 28 July at the Gladstone Entertainment Convention Centre on Goondoon Street.

The IICA says the expo is a one-stop shop to find out what's new in the industry, make valuable new business connections and catch up with friends. Everyone is welcome to attend, including electricians, engineers, maintenance managers, production planners, operational staff, instrument technicians, health and safety officers, managers, apprentices and students.

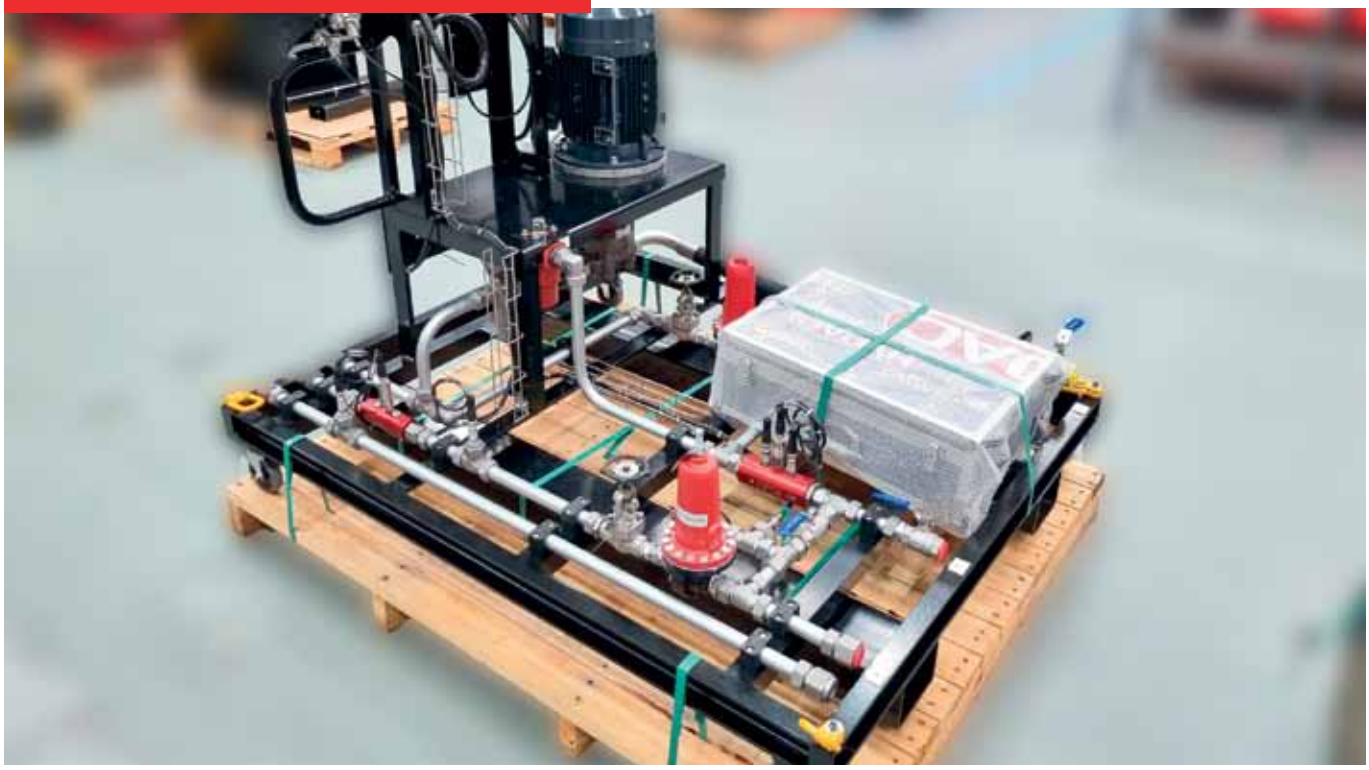
There will be more than 55 exhibitors, including Pilz, Weidmüller, ifm efector, Emerson, Endress+Hauser, Phoenix Contact, SMC, Yokogawa and Teksal Safety to demonstrate the latest in instrumentation, automation and control.

Doors will open at 2 pm and there will be lucky door prizes to be won throughout the day. Attendees are invited to join the IICA and the exhibitors for a complimentary Happy Hour at 5 pm.

Entry to the expo is free and readers can register online at: https://bookings.iica.org.au/bookings/events/event.asp?bookingid=1356.

Registrations before the event day go in the draw to win one of three Amazon Echo Dots.

IICA (Institute of Instrumentation Control & Automation)
www.iica.org.au



PUMP TEST MODULES KEEP HPUs IN TIP-TOP CONDITION

Locally made pump test modules help keep hydraulic power units in optimal condition.

Recently HYDAC provided pump test modules to a world-leading resources company to help keep hydraulic power units in optimal condition.

HYDAC Australia's Adriaan Engelbrecht, based in Perth, said the in-house designed pump test modules were an added feature on the HPUs supplied by HYDAC to the resources company.

Pump efficiency testing automatic

"The HYDAC modules automatically test pump flow rate, pressure levels and overall pump efficiency, among other things," he said. "All these functions can be fully remotely monitored by the company's Plant Information Management System.

"The system automatically tests pump efficiency within a specific time period, by automatically running through a test sequence."

Trend on pumps informs preventative maintenance

The data, generated by running these tests within timeframes and hard parameters provided by HYDAC, gives a performance trend on the pumps, including information on the pump's condition and whether it has been deteriorating over time.

"This information then informs the preventative maintenance required on the pumps, which is an effective way of maintaining healthy pumps and reducing downtime," said Engelbrecht. "If set points are exceeded, immediate warnings are sent to necessary personal."

Timelines

HYDAC was contracted to commission two of the resources company's HPUs in October and November 2021.

"Last year we manually went through the pump test modules to see if they were operating," said Engelbrecht. "Just before Easter we assisted the customer with on-site commissioning, and I'm happy to say the module ran smoothly, and implementation was easy."

HPU monitoring a focal point

Engelbrecht highlighted that HPU monitoring has been a focal point in their development.

"In line with this, the company has a CME module on HPUs and pump test monitoring," he said. "Overall, the added value that this kit brings is a great company investment to keep HPUs in tip-top condition."

In addition to pump testing and condition monitoring, HYDAC offers an extensive product range to cover all areas of fluid power. The company also provides on-site reliability audit program, cleanliness solutions for oil and fuel, calibration services, engineering advice, bespoke design, drawings, hydraulic services, technical training, and Industry 4.0 solutions.

HYDAC products are locally engineered, manufactured and tested, and they are under a quality system certified in accordance with ISO 9001. With experience across all electrical areas, involving motor control, process control, automation and AutoCAD, HYDAC is specialised in hazardous area design and installation. The technical training courses offered by HYDAC Australia are nationally accredited and the only ones of their kind in the country.

HYDAC International
www.hydac.com.au

LONG-DISTANCE LASER SENSOR

The Acuity AR1000 Long-distance Laser Sensor measures targets from 0.1 m up to 30 m without the use of reflective targets. It can work with opaque targets, including glowing steel at temperatures up to 1000°C. The accuracy is typically ±3 mm, depending on the reflectivity of target surface, ambient light and temperature conditions. Dark-coloured targets may decrease the laser's range and accuracy.

In simple sampling modes, AR1000 self-determines the optimal sampling speed, waiting until it collects enough light to make an accurate measurement. Typical sampling output rates are 6 Hz, but 50 Hz sampling is possible at close ranges to white targets. For long-distance measurements, a larger target with a retroreflective target material can be used to increase the maximum measurement range to 150 m. The AR1000 has a Class 2, red visible laser diode for simple aiming and set-up. The spot size is 5 mm as the light leaves the laser, and the beam has a divergence of 0.6 mrad.

A standard RS232 or optional RS422 serial interface is available for communication with a computer or PLC. The AR1000 also comes with a standard, 4–20 mA analog current loop output. The analog output can be programmed to have a custom measurement span, and the minimum and maximum currents can be set to any points in the laser's range. The AR1000 has a single limit output for indicating alarms. This can be useful for triggering an external device when a target reaches a set position.

Slentech Pty Ltd
www.slentech.com.au

AIR COMPRESSOR

The latest compressor from Kaishan, the PMV 250, utilises permanent magnet motors and variable frequency drive technology. The combination of integrated systemic optimisation of the compressor unit with an advanced permanent magnet motor, SKY 2-stage airend and rapid response, variable speed drive is said to result in a compressor that needs less energy input to drive an efficient compressor while generating greater output.

Rare earth technology gives the permanent magnet motor higher energy efficiency compared to conventional induction motors. PM synchronous torque motors provide faster acceleration and deceleration, a great advantage in compressor applications as they can rapidly vary output to match application demands.

With integral variable speed control, the compressor operates at the level of immediate demand, reducing both input energy needs, machine wear and tear and maintenance requirements. These air compressors are therefore designed to deliver high efficiency and performance in a heavy-duty machine that is also said to possess durability and reliability.

Kaishan offers the PMV compressors in power ranges from 15 to 250 kW to suit the needs of a wide range of industry applications.

Kaishan Australia Pty Ltd
www.kaishan.com.au

HOW DIGITAL THINKING IS UNLOCKING

THE FOURTH INDUSTRIAL REVOLUTION AND ACCELERATING GROWTH OPPORTUNITIES IN TODAY'S WORLD

We're witnessing the acceleration of the fourth industrial revolution, spurred on by the climate emergency and the shift to net zero industrial practices. Immense challenges remain, yet adopting an innovation mindset, by embracing artificial intelligence and cloud technologies, using digital twins and integrating data to operate more efficiently, will drive future success.

The past two years have demonstrated the power of thinking differently. Industries who invest in the cloud and digital twins while harnessing the potential of artificial intelligence — in other words, those adopting a truly digital mindset in response to disruption — are set to succeed.

With the pandemic continuing and the climate crisis intensifying, what began as a survival reflex has developed as a pathway to a more efficient, networked and sustainable future. As the World Economic Forum's annual meeting in Davos convened for the second year in a row, global business leaders are reflecting on the lessons learned in crisis, and what they mean for our networked world. Schneider Electric would like to take the opportunity to share a few thoughts on how these trends are already shaping the industries of the future.

Integrated data and analytics hold the key to efficiency

Operational resilience, values-led leadership and data-centric operating models have together created new avenues for growth. Manufacturing and industrial teams across the world have adjusted to different ways of operating. Providing more than just resilience, a digital approach helps to overcome logistical disruption and supports generational shifts in the workforce. As we consider further disruption driven by the climate emergency and which, in time, will dwarf the pandemic, we believe that long-term business success lies in pivoting to data-led operations.

Data-led automation increases productivity

Industry-specific artificial intelligence (AI) enables companies to work more efficiently. Pattern recognition from digital twins combined with AI and decision support connects systems so people can work in new ways. Some of Schneider Electric's smart manufacturing factories in Asia experienced this first-hand because of social distancing measures enforced during lockdowns in 2020. As factories were closed to workers, operations moved to the cloud, and even while functioning remotely, teams safely achieved 30% increases in productivity. The lessons learned in those early days of the pandemic have set new efficiency standards that are being deployed throughout our global network in 2022.

Digital thinking unlocks ingenuity

Most organizations operate hybrid networks that combine data that is stored both on-premise and in the cloud. Increasingly, companies are looking to share data securely but agnostically throughout their industrial ecosystem. We call this the connected industrial economy. Companies should embrace this to boost efficiency with suppliers, partners and customers and accelerate growth throughout the value chain. According to Gartner, cloud-based data-sharing is key to integrating working teams and driving the decision-making required to cut carbon emissions, increase profitability and ensure agility. Aker Carbon Capture is using AVEVA cloud-based software to design leading-edge facilities capturing carbon dioxide from industrial operations.

Digital innovations can bring net-zero closer, quicker

As witnessed during the pandemic, digital operating models drive more efficient ways of working. Our strategic alliance with EDF in France will deliver the next generation of nuclear facilities and our collaboration with Enel supports their automated plant vision. These are just the beginning of the new, low-carbon power generation industries of the future, enabled by adopting a digital mindset.

In today's business world, turbulence is one constant. By adopting a digital mindset built on continuous innovation, industries can use data-centric intelligence to become more agile and capture more growth. This digital foundation, enhanced with AI and scaled in the cloud, gives us the confidence to succeed both in today's changing world and for tomorrow's sustainable future.

Life Is On | Schneider Electric

Schneider Electric
https://se.com/au/makeitforlife

NEW PRODUCTS

2D VISION SENSORS

Different parameters can play an important role in vision applications. Pepperl+Fuchs VOS vision sensors are said to offer a simple solution for the majority of requirements. With integrated optics, lighting and electronic analysis, all the key components are housed in one compact device. The lenses can be selected to suit the measurement distance, size of the measurement object and test criteria.

Many models feature an integrated ring light, but external lighting is also available in the form of side or rear lighting or light and dark field illumination. Standard interfaces and a comprehensive range of accessories allow the sensor to be optimally adapted to the application.

Industrial applications require a high degree of flexibility and an equally low susceptibility to errors. Whether in machine and plant engineering, conveyor technology or the packaging industry, the widely applicable VOS 2-D vision sensors are designed to provide fast and reliable measurement data for precise quality control.

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

COMPRESSOR

The Boge S-4 air compressor series has been expanded to include additional power ranges.

The latest model — the S 91-4 with an output of 90 kW — is designed to produce free air delivery at low specific power consumption. These efficiency benefits are achieved due to its construction concept, with generously sized components reducing internal pressure losses and a high-efficiency airend.

With its robust design, the direct-drive airend is hermetically enclosed and offers maintenance advantages over belt-driven models, which can suffer from high levels of wear in certain areas of application. When combined with a frequency converter, the speed of the S-4 series compressor can be varied, making it suitable for adapting to the exact compressed air requirements for the task.

Using vibration isolation for individual components and the flow of cooling air, Boge has also been able to reduce noise. To make the best use of the energy supplied to the device, heat recovery can also be added, allowing the heat created by the running of the device to warm service water or for other processes.

For intelligent compressed air management, the modular focus control 2.0 control system and airtelligence provis 3 interlocking control are available.

Boge Compressors Ltd
www.boge.net.au

PROGRAMMABLE AUTOMATION CONTROLLER

ICP Australia has introduced the ICP DAS XP-9371-WES7, a 3-slot metal standard PAC with an Intel Atom E3827 CPU and WES7. The XP-9371-WES7 combines computing, I/O, and operator interface into a single unit and provides a solution for integrating HMI, data acquisition, and control in an individual PAC.

In addition to the Intel CPU, the XP-9371-WE37 is equipped with three I/O expansion slots, and a variety of connectivity options including dual Gigabit Ethernet, VGA, USB port, RS-232 and RS-485 interface. Local I/O slots are available to use ICP's I-9K and I-97K series I/O modules and remote I/O expansions are available to use the company's Ethernet I/O modules and RS-485 I/O modules. Since WES7 has the same Win32 API as Windows 7, most popular applications on a desktop can run on WES7-based CPU PC.

In terms of installation the XP-9371-WES7 offers DIN rail and wall mounting, can operate at varying temperatures from -25°C to +75°C, and has redundant power inputs.

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

VEGA USHERS IN A NEW LEVEL ERA WITH THE 6X® RADAR SENSOR

Until now, choosing an instrument was a laborious process and often involved a lot of questions and product research.

Traditionally, the search for a suitable radar sensor begins with the question, which frequency would work best for this particular application? 26GHz or 80GHz? Or perhaps 6GHz would be better? This is followed by thoughts about the properties of the media and how it could influence the measurement, as well as the specific installation environment. Furthermore, the temperature range or the presence of aggressive chemicals may give cause for concern. Will a standard process fitting be sufficient, or would special materials that meet the highest requirements be the right choice, if only because the user is not completely sure and wants to be on the safe side? And what else should be considered if the sensor is to measure great distances or be exposed to wind and weather all year round?

These and countless other questions make one thing clear: with such a wide choice, users also have to select the right choice. They have to choose from the large variety of radar sensors that are currently on offer, and because the areas of application are becoming more multi-faceted and processes more complex, the buyer needs a good understanding and overview of what's on offer on the market. It takes the right know-how, experience and time to avoid making costly bad investments and get a reliable measuring system.

A new certainty: One for everything

Until now, choosing an instrument was a laborious process and often involved a lot of questions and product research. VEGA is now turning this process inside out with its new VEGAPULS 6X.

"Ultimately, it's not the sensor that counts, but what the user can achieve with it in their individual application," said Florian Burgert, VEGA product manager. "Just knowing that they've chosen the best possible instrument solution, and that they'll reach their goal faster with it, makes a big difference in their everyday operations."

With the VEGAPULS 6X, selecting the right frequency or determining the dielectric constant of the medium are no longer obstacles, because choosing the right sensor specifications has become much easier. The new configurator asks for the type of application and then quickly determines which sensor version is required. The entire procedure now consists of just a few mouse clicks, but of course an advisory discussion with a VEGA radar specialist is still a good alternative to the configurator. In any case, the result is unprecedented simplicity for users and a measurement solution that delivers perfect results independently of the media properties, process conditions, vessel shapes and internal installations.

Focusing on the application

Product manager Jürgen Skowaisa sums up in two words the strategy VEGA is pursuing with VEGAPULS 6X: maximum simplification.

"Until now, there were many different sensors that could be used for an application, but today, with VEGAPULS 6X, there is one sensor for all applications," he said.

Even setup and commissioning, he says, has been reduced to a minimum, requiring now just a few clicks and the input of basic data.

"Our customers can even order a sensor that has been factory calibrated, customer-specific down to the last detail, which only has to be installed and connected. It doesn't get any easier than that.

"Furthermore, our technology has reached such a high level today that reliable function is no longer the issue," said Skowaisa. "The only risk now is choosing the wrong sensor."

Thanks to the new approach with VEGAPULS 6X, VEGA now provides the tools to get the right sensor version for the application in 99% of all cases, while keeping experienced application engineers on standby to help with the special, more difficult applications.

"In the future, the user will no longer have to worry about the technology, frequency or instrument version — the measurement will simply work," he said.

VEGA

VEGA Australia Pty Ltd
www.vega.com

AS I SEE IT

THE NEXT BIG DRIVER FOR INSTRUMENTATION AND CONTROL: THE ESG CRITERIA

The set of standards known as Environmental, Social and Governance (ESG) Criteria may be considered an unnecessary distraction by hardened instrumentation and control engineering professionals. There is, however, a tsunami of demand globally to demonstrate these principles in an organisational setting, and almost a third of all professionally managed assets (~$US-30trillion) are now considered defined by ESG.

The first standard — Environmental — involves a commitment to sustainability, including a reduction in CO_2 emissions (ultimately carbon neutrality) and a reduction in waste, energy and water consumption.

The second standard — Social — focuses on improving diversity, equity and inclusion in an organisation. It also encourages the consideration and betterment of the community.

The last standard — Governance — urges organisations to be guided by ethical business practices (with external oversight) and to be responsible global, corporate citizens.

As the old mantra goes: "what gets measured, gets managed", but are better outcomes the result of imposing these standards? And as engineering professionals, can we uphold them? In practical terms the Environmental standard is a natural focus for engineering professionals.

The instrumentation professional is pivotally placed to reduce our impact on the environment. For example, good PID control cuts pump speed based on flow data. This saves power, lessens wear and tear and therefore contributes to sustainability. Similarly, remote monitoring translates into fewer site visits, which in turn reduces emissions (and saves money).

The devil is always in the detail, but there are generally two overarching approaches when dealing with environmental issues and climate change. The first is mitigation: reducing emissions and increasing efficiency — and adaptation — protecting infrastructure to offset the inevitable impact of climate change.

These approaches are not mutually exclusive; both should be considered and adopted. Bolting on renewable energy sources or recycling water, for example, would be considered mitigation. Adaptation, on the other hand, may involve protecting a site and its infrastructure from frequent flooding and higher temperatures. Obvious solutions would include moving equipment to higher ground and adjusting building specs.

There are still two other ESG standards to consider. The Social principles are achievable, although altering the staffing structure of a company precipitously could endanger productivity. An alternative approach is to institute training programs. Using your organisation as an example, explain how technologies can assist other industries reduce emissions and wastage, and improve energy efficiencies. Or provide workshops on STEM topics in your local school, or to the community: targeting women and social groups who remain under-represented in the engineering industry. After all, knowledge in STEM and industrial automation are increasingly relevant and useful.

The final standard — Governance — can be achieved by an unerring emphasis on ethical best practice in every action, with open and transparent communication.

Ultimately and finally, curiosity and learning must be valued with a greater awareness of ESG in engineering industries. Instrumentation professionals are strongly analytical with a keen focus on measurement; they are, therefore, extraordinarily well placed to further the essentially decent values inherent in ESG.

Acknowledgements

Howard-Grenville J 2021, 'ESG Impact is Hard to Measure – But it's Not Impossible', *Harvard Business Review*.

**Dr Steve Mackay has worked in engineering throughout Australia, Europe, Africa and North America for the past 40 years in the mining, oil and gas and power industries. A registered professional engineer in electrical, mechanical and chemical engineering, he believes university engineering programs need to be strongly focused on industry. He has been the author or editor of over 30 engineering textbooks sold throughout the world.*

40 CELEBRATING YEARS

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Printed and bound by Bluestar Print
Print Post Approved PP100007403
ISSN No. 0819-5447

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