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DIGITAL TRANSFORMATION IN INDUSTRIAL MANUFACTURING

A STRATEGIC GUIDE — PART 1

*Matt Newton, Senior Technical Marketing Manager, Asset Performance, AVEVA**



Improve profitability and maximise return on capital across the operations and asset lifecycles to enhance competitiveness and cut the hype.

Changing market conditions and shifting technology landscapes put pressure on industrial businesses. Fluctuating commodity prices and oversupply contribute to capital expenditure challenges, while increased competition and consolidation force businesses to compress construction, engineering and design cycles. Environmental, quality and safety regulations are becoming ever more rigorous, and the workforce is evolving, as a tech-savvy, yet less experienced generation moves into roles once held by industry veterans, who are looking to pass on their knowledge and experience before leaving the workforce. Meanwhile, geopolitical uncertainties make it difficult for businesses to know where to invest. Market norms have been rewritten, affecting profitability in some segments and forging tremendous opportunity in others. In parallel to these societal and economic pressures, digital transformation is enabling flexible, agile solutions that companies can implement to overcome and prosper from these challenges.

Undergoing a digital transformation can enable companies to enhance their capabilities, increase their reach and maximise returns across their asset and operations value chains. Pivotal technologies like cloud computing, the industrial Internet of things (IIoT), artificial intelligence, and augmented and virtual reality, are transforming traditional industrial operations. These innovations represent unprecedented potential growth opportunities for businesses, but they also create new risks to the modern enterprise in the areas of cybersecurity and data privacy. These factors introduce new uncertainty into the industrial business environment.

Digital transformation

How can your business identify where to invest in such a rapidly evolving marketplace? What new opportunities does digital transformation offer your business? How can you manage your enterprise's risk exposure? These questions can be overwhelming at first glance. But as shown in Figure 1, digital transformation

is a key imperative for leading industrial businesses to master.

To be successful, your company needs to improve profitability and maximise return on capital across both assets and operations. In the context of capital asset lifecycle management this includes everything from how an asset is designed and engineered, to how it's operated and maintained for optimum availability and uptime. At the same time, every minute of the operations lifecycle must be optimised to ensure that you stay ahead of the pack. From operations planning to real-time operations management, you need to balance production against the constraints of operational efficiency to maximise your return on asset investment.

Unique user experiences — not IIoT hype

We've all experienced the hype around the IIoT. Vendors in almost every industry claim their implementation of augmented and virtual reality (AR/VR), mobility, cloud and artificial intelligence will disrupt modern industry. But beyond all the hype and buzzwords, a radical change is occurring. That change is focused on delivering unique and exceptional user experiences, through digital technology. And it's impacting almost every industry today.

The cable television industry has been significantly impacted by new competitors that leverage an almost entirely online distribution model. Encyclopaedias and newspapers have been replaced with digital content, distributed through mobile devices and social media. And Netflix and Amazon have replaced the neighbourhood video and book store. This change has been driven by digital challengers offering a better customer experience, enabled through transformed business models. To succeed in the digital economy, businesses must embrace and integrate this new technology. Digital transformation represents both a significant opportunity and a threat to every industrial enterprise.

Backed by the wealth of information the internet and digital technologies deliver, an unrestrainable shift in how businesses and industries function is occurring. From the



Figure 1: A world in constant change.

plant floor to the C-suite, digital technology is helping to identify and execute on new competitive advantages. From the oil and gas industry to power generation, chemical production, food and beverage and consumer packaging, ongoing digital transformation is a key objective of the most successful businesses in the world.

To address the challenges and opportunities ahead, you need to find innovative ways to fuse digital technology with your existing people, processes and assets to ultimately drive new insights that:

- enable continual process improvement
- help your teams to manage rapid change
- deliver outstanding and differentiated customer experiences
- empower the workforce while creating an environment that attracts and develops top talent.

New data, new insights

Digital technology can help you to design, manufacture, deliver, support and maintain products faster, more efficiently and at lower costs. By bringing together previously inaccessible data streams, enhancing live visibility and analysis of your operations, and driving actionable insights based on better information, you can improve enterprise performance by:

- reducing unscheduled downtime
- improving regulatory compliance and safety
- integrating supply chain logistics with customer operations
- optimising maintenance strategies
- enhancing situational awareness throughout the enterprise
- reducing waste
- increasing overall equipment effectiveness (OEE).

Key to achieving these benefits is creating a seamless and continual stream of process and production data that is integrated with historic operations information and then contextualised into new insights on your overall enterprise. Data may already exist within the organisation stored in historian software or 3D models of plants and assets, but new digital tools can tap into these existing data stores and synthesise them with operational data. This process generates improved insights on how to maximise value creation across asset and operations lifecycles. Digital transformation empowers your people to take insightful and information-driven action to identify and solve problems at their source, before they compound into critical failure points that cascade into further problems.

For this amalgamation of knowledge to occur, digital tools and processes need to tap into both operations technology and information technology. In this way, the best technology can establish a bridge between the physical world where value creation takes place through production and delivery, and the digital world where enterprise planning and forecasting occur. Digital transformation is the process of building a digital value chain that drives closed-loop operational excellence and unique customer experiences throughout the enterprise.

The digital transformation journey

Digital transformation merges the latest innovative tools and processes with your in-house domain expertise. This enables not only the contextualisation of new and existing data but also delivers actionable insights and information. The organisation can then execute upon these new insights

and close the loop towards continual process improvement. This takes time and often involves adopting many diverse technologies and processes to continually build momentum towards sustained operational excellence. For this to occur, every digital transformation journey needs to begin with the critical understanding that information and data have become a priceless and strategic asset to the enterprise.

The faster your team can collect, visualise and analyse data, the faster it is empowered to take insightful action that will benefit your operations and your customers. The overall tactical objective in achieving digital transformation is to create a real-time operational control loop that accurately and efficiently manages your enterprise, based on information and analytics.

Real-time operational information

Real-time operational information is used to understand what is happening in real time and enables the condition management of asset and operations lifecycles. For example, a dashboard displaying vibration frequency of a rotating asset such as a turbine during operation provides real-time understanding of the asset's operational behaviour and state.

Historical operational information

Historical operational information helps you to understand what has happened in the past to create intelligence around the operational behaviour of assets. Through operational trends, display of KPIs and dashboards, you can create abstracted views of operational states. For example, a graph may be displayed on a dashboard showing the turbine's past vibration frequency during operation.

This can be compared to the real-time vibration frequency, creating intelligence on the asset's long-term operational trends.

Predictive analytics

Predictive analytics is used for what-if type modelling. Integrating up real-time and historical data enables your team to assess potential outcomes of operational states and behaviours, even accounting for tertiary variables. Deterministic or non-deterministic models can then be applied for open-loop simulation and predictive analytics. For example, given the turbine's current maintenance state, you can now estimate how long it can run before it fails.

Prescriptive analytics

Prescriptive analytics describes what's needed to optimise asset and operations

lifecycles. Scenario-based guidance is created and delivered through learning elements and closed-loop algorithms to enable your team to calibrate planning and scheduling across the entire enterprise value chain. For example, using a unified supply chain model, scenario-based calculations can be used to optimise maintenance schedules and performance, minimising impact to your operations.

But to be effective, data and information must be captured and turned into actionable insight through three key processes:

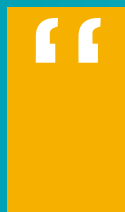
- 1. Strategise:** First, define key performance and scorecard indicators for the business. Then leverage digital technology to connect people, processes and assets in real time creating a complete digital value loop that collects and contextualises enterprise data.
- 2. Analyse:** Convert raw data into actionable insight, using machine learning and advanced pattern recognition to drive predictive insights on process and operations optimisation so that your team can identify value 'leaks' and expose new market opportunities.
- 3. Maintain:** Implement digital toolsets that reduce unscheduled downtime, optimise asset management and maintenance, increase overall equipment effectiveness and drive unique and better customer experiences.

The three steps above are helping leading companies to create so-called digital twins of enterprise operations and asset lifecycles. Using digital twins of operations processes, assets and even entire industrial plants is helping leading companies to model and optimise individual asset performance and even full-scale plant operations.

Lifecycle management through digital twins

A digital twin is a representation of the physical object in terms of data and information; like a pump, motor, turbine, even an entire industrial plant or a fleet of plants. Digital twins enable full lifecycle management of physical assets and processes. This starts with unified engineering, where process design, modelling and simulation are combined with overall plant design to create an integrated engineering environment and collaboration workflow.

Unified engineering facilitates the use of common engineering tools and streamlines



TO ADDRESS THE CHALLENGES AND OPPORTUNITIES AHEAD, YOU NEED TO FIND INNOVATIVE WAYS TO FUSE DIGITAL TECHNOLOGY WITH YOUR EXISTING PEOPLE, PROCESSES AND ASSETS.

the handover and revision process. Each plant can draw upon its own digital data 'lake' supported by a common artefact repository that spans integrated process design. These resources streamline engineering effort and make it easier for global teams to collaborate, thereby lowering the total cost of engineering. During the design phase, digital models allow your teams to analyse processes, equipment and operations through multiple simulations to define the optimum approach for safety, reliability and profitability. At the concept phase, your teams can analyse asset and process design alternatives swiftly, with continuous iteration through variable specifications. This allows your team to create integrated asset models of interacting but separate systems. Each iteration provides a more complete dataset, which in turn feeds into agile software development.

As assets are deployed and plants commissioned, the digital twin is continually updated with ongoing operational and process data such as maintenance and performance records and IIoT sensor information. During operational stages, variations from optimal process and asset design are captured during runtime, and the digital twin is automatically updated with this information. Knowing the current state of an asset, the digital model can use predictive learning technology to proactively identify potential asset failures before they occur and even suggest ways to prevent those failures. In other words, the digital twin can predict when its physical counterpart will break, well before that happens.

The digital twin also uses artificial intelligence with advanced process control, control strategy design and process optimisation. These tools incorporate necessary variations from process and asset design into the engineering asset or plant data, enabling a complete and efficient digital value loop and unified lifecycle management.

As you scale up to a digital twin of the enterprise operating model, inefficiencies and

opportunities in your ongoing operations can be identified and executed upon in real time.

Bringing together feedstock data management, planning, scheduling and envelope optimisation activities, unified supply chain management provides increased granularity on your enterprise operations. The impact of uncertainties and data changes can be viewed, analysed and understood in real time, to generate realistic operations plans supported by feasible production schedules. Simulation of plant-wide activities helps your team to make informed decisions about everything from asset to enterprise level operations in real time.

Assets designed and shipped today typically have digital communication and connectivity built in. This means they can easily share the data they generate with other systems. For assets and facilities built and deployed before widespread digital connectivity, digital tools like smartphones, tablets and sensor technology can help to realise the benefits of digital twin technology quickly and affordably, while offering substantial improvement in workflow efficiency. With today's tech-savvy workforce, it is quicker to train your operators. And new tools such as augmented and virtual reality technology further accelerate this process.

In Part 2

Part 2 of this article will describe the many technical benefits that a digital transformation can bring to your organisation, and introduce the steps to getting there.

**Matt Newton is Senior Technical Marketing Manager for AVEVA's Asset Performance Management portfolio. With over 15 years' experience planning, developing and implementing diverse batch and process automation applications, he has extensive experience designing and implementing IIoT and machine-to-machine applications from the network edge to the enterprise cloud.*

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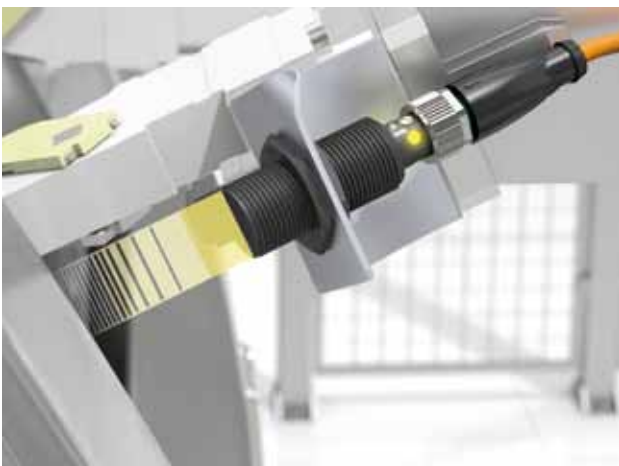
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Efficient process-controlled access guarding without muting sensors



Innovative strength, a down-to-earth culture and strong commitment are the values that have made WITRON — based in the Upper Palatinate region of Germany — a leading company in the planning and realisation of warehouse and order picking systems in the field of intralogistics.

The company is constantly working on developing even better, more cost-efficient and safe logistics solutions for its customers. In the area of automation and further optimisation of warehouse logistics, the selection of suitable partners also plays a decisive role.

When man and machine meet in a mechanised environment, it must be possible to stop machine and system parts within a fraction of a second. “The safety of all persons who work in one of the many logistics centres of our customers around the world — whether in industry, retail or service — is the asset most worthy of protection,” explained Stephan Schmid, Project Engineer in the area of development and control technology at WITRON. This means that appropriate areas are equipped with safety devices or fencing that meets the applicable standards and norms so as to eliminate accident risk before it can even occur.

But because it is not possible to completely fence in all areas in which man and machine meet in a networked, mechanised system, WITRON is working on systems such as conveyor lines with safety light curtains that must reliably distinguish between people and merchandise.

Especially in intralogistics and in the automotive and packaging industries, affected areas must be safeguarded by optical safety sensors.

To unambiguously recognise transported goods as they approach a protective field and to bridge this for passage of the goods at the proper time, muting processes with signal-emitting muting sensors have been used across the industry in the past. These sensors were

installed in addition to the safety light curtains and enabled pallets and transported goods to move in and out without interruption. In front of and behind the safety light curtain, however, quarters are usually a bit tight. The additional use of bridging sensors often required more space, leading to a less compact system design. The installation and service effort for the additional set-up, alignment and realignment of these sensors also resulted in additional work. “This led WITRON to search for a solution that combines process reliability, system availability and easier operation with one another,” Schmid explained.

At that time, Leuze electronic did not yet have a practical answer to this requirement, but did already have a project idea. The idea, known as ‘Smart Process Gating’ is based on its MLC safety light curtains. Leuze electronic presented this to WITRON in a very early

development phase. WITRON was quickly convinced of this idea and assisted Leuze development in numerous practical tests. Smart Process Gating (SPG) was then put through its paces by WITRON on its test tracks in its company headquarters, where it was further optimised.

“The result is impressive: a clever solution was created that combines the requirements for safety at work with high process reliability and system availability,” explained Josef Apfelbeck, Key Account Manager and Specialist for Intralogistics at Leuze electronic. With SPG a new process was created that enables muting processes to be executed more easily, more compactly and more stably. With the SPG principle developed on the basis of Leuze’s MLC safety light curtains, it is possible to completely forego the previously necessary muting sensors. Conveyor systems can thus be made more compact. During the operating phase, the risk of misalignment or damage to the sensors is also eliminated as are the costs for their maintenance and servicing. The availability of the entire safety device is thereby increased and other practically oriented risks reduced.

With SPG, the first muting signal comes from the process control (PLC), while the second muting signal is generated by the protective field itself. SPG requires a controlled material flow so that the necessary PLC control signals are made available in the expected time window. The MLC 530 safety light curtain variant with SPG is TÜV certified for safety.

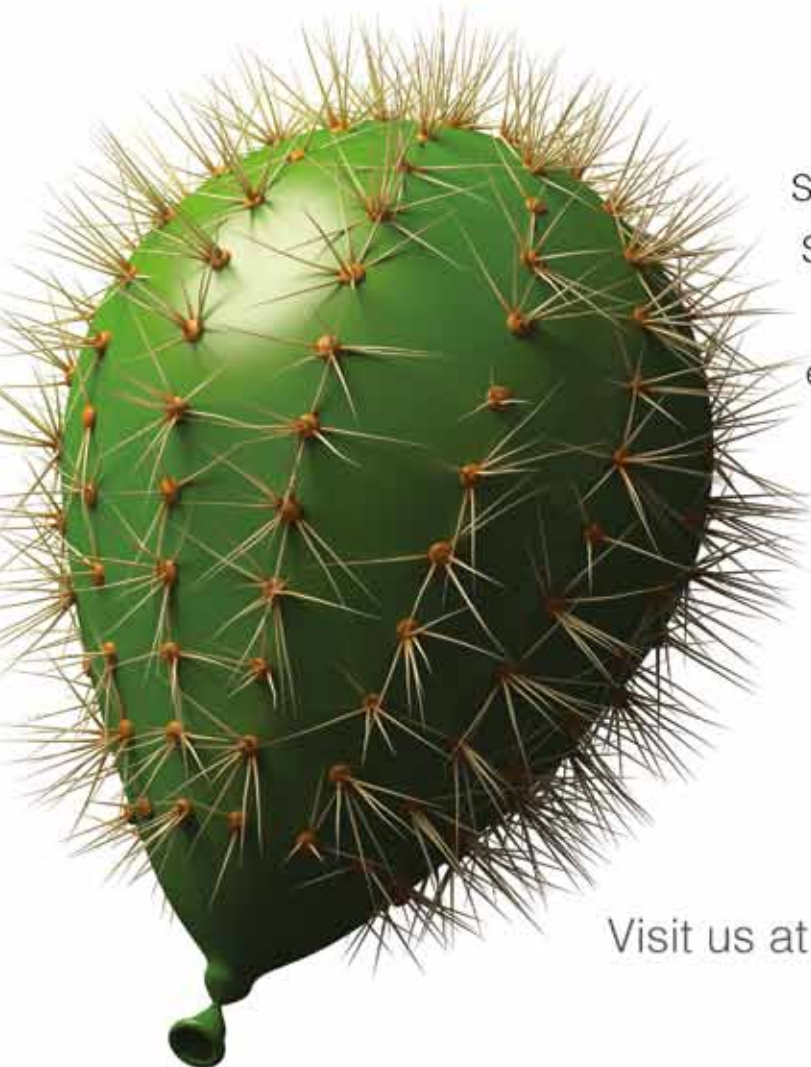
In combination with a standard control, a performance level PL d can be achieved, which is sufficient for many applications in intralogistics. With a safety control, performance level PL e is also achievable.

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The module also has Layer 2+ switching, which provides support for VLAN's QoS, port policies, ACLs, RSTP, STP and link aggregation.

Operating temperature range is -40 to +60°C, and the device is designed to meet MIL-STD 810 and MIL-DTL-901E.

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NOSHOK has announced range of three pressure transmitters. The 20, 25 and 30 Series Intelligent Pressure and Level Transmitters are designed to address the specific requirements of the food and beverage industry. They are suitable for hygienic applications and harsh, aggressive ambient conditions.

NOSHOK 20, 25 and 30 Series Transmitters feature a design that positions the pressure and temperature sensors directly behind the diaphragm, which minimises fill fluid and allows the use of a smaller diaphragm. This provides active temperature compensation at the point of measurement to minimise temperature error. Turndown ratios up to 10:1 allow greater rangeability, minimising inventory requirements. Accuracies are based on percent of adjusted span, not full scale range.

Constructed of polished stainless steel, NOSHOK's intelligent transmitters feature programming via a standard onboard display with no pressure source required, and are also available with HART protocol. These transmitters have a 360° rotatable display for flexibility and readability in multiple mounting positions.



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ULTRAHEAVY-DUTY BULK BAG FILLER

The latest ultraheavy-duty bulk bag filling system from Flexicon receives abrasives, high-density solids and other difficult-to-handle bulk materials from upstream processes, and fills the material by weight into bulk bags. Intended for mining, glass, ceramics and other demanding industrial applications, the system comprises heavy-gauge variants of the company's TWIN-CENTREPOST filler and flexible screw conveyor consolidated on a robust skid with integral forklifting tubes for mobility.

The filler is equipped with fill head height adjustment to accommodate all popular bag sizes, pneumatically retractable bag hooks and an inflatable connector to seal the bag inlet spout. A feed chute outlet port can be supplied with a filter sock for dust-free air displacement during filling, or vented to an optional BAG-VAC dust collector or the plant's bag house.

The conveyor consists of a steel outer tube with a rugged flexible screw that self-centres as it rotates, preventing material from grinding between the screw and tube wall while eliminating the need for a bearing at the intake end. Since the screw is driven at its upper end beyond the discharge point, material contact with seals or bearings is eliminated.

Once the operator attaches the bag straps and activates the inflatable spout seal, the conveyor runs at full rate as the filler's vibratory deck cycles densifies and stabilises the material. Load cells transmit weight data to the PLC, which slows the conveyor rotation to trickle-feed rate, stops the conveyor once the bag has gained its target weight and releases the bag straps.

Flexicon Corporation (Aust) Pty Ltd

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DRAGCHAIN SERVO CABLE

The Ölflex SERVO FD 796CP is an EMC-compliant servo cable supplied by LAPP. It is designed to allow for much faster speed and accelerations, increasing the economic efficiency of the machine.

Designed for high-speed multiple changes of position the Servo FD 796CP cable supports an acceleration of up to 50 m/s², at speeds of up to 5 m/s and travel distances up to 3 m. This makes work considerably faster and more efficient than was possible with previous drag chain cables. In addition, the proportional run-up and braking times have been reduced by up to 96%.

With a wide application range, this cable is suitable for various uses. It can be used for connecting cables between a servo controller and motor, in power chains or moving machine parts, or for use in assembling and pick-and-place machinery. In addition, it is safe to use in wet areas of machine tools and transfer lines.

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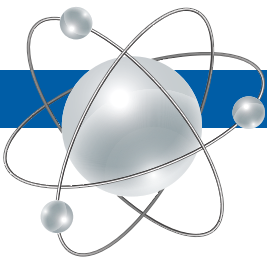


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AI automatically detects disturbances in power supply grids



Andre Kummerow, a researcher at the Advanced System Technology (AST) branch of Fraunhofer IOSB, working on an algorithm.

The way power is generated is in transition: whereas, before, all our power came from big power plants, these days it comes from a range of distributed sources as well, including wind turbines, photovoltaic systems and other similar facilities. This shift has a big impact on our grid — with particular challenges for operators of transmission grids. How to monitor the proper functioning of grid parameters such as phase angle and frequencies? Might there be discrepancies or anomalies in the proper functioning of the grid? Or are there lines or power plants down? Today's standard measurement technology is no longer able to reliably furnish answers to these sorts of questions. More and more operators are therefore turning to additional phasor measurement units (PMUs) and other digital solutions. These systems measure the amplitude and phase of current and voltage up to 50 times a second. This process generates huge volumes of data, easily several gigabytes a day.

In response, researchers at the Advanced System Technology (AST) branch of the Fraunhofer Institute for Optronics, System Technologies and Image Exploitation IOSB in Ilmenau, Germany, are looking for ways to optimise the data processing using artificial intelligence, with a view to improving grid reliability and establishing a power supply system fit for the future. "We can use AI to automatically log, compress and process up to 4.3 million data sets per day," said Prof. Peter Bretschneider, head of the Energy department at the AST branch of the Fraunhofer IOSB.

In the first phase of their work, the researchers have come up with a compression technique that saves 80% of the data. Not only is it easier to store the data, but also faster and more efficient to process it.

In the second phase, the researchers went on to utilise the phasor measurement data they had collected to apply neural networks — one of the key components for today's AI technologies. More specifically, they fed the neural networks with examples of typical system outages. This way, the algorithms gradually learn to distinguish — and precisely categorise — normal operating data from defined system malfunctions. Following

the training phase, the researchers applied the neural networks to current data generated from phasor measurements — data that previously had to be taken and manually processed. This is where the algorithm made its first leap into real-time application, making split-second decisions on where there is an anomaly or fault, as well as the type and location of that disturbance. To take an example, if one power plant should fail, an abrupt spike can be expected in the load placed on the other power plants. The increased load slows down the generators and the frequency decreases. This calls for rapid countermeasures because if the frequency sinks below a threshold value, the operator may be forced to cut off sections of the grid for the sake of system stability. And by rapid, we are talking about less than 500 ms. Since the algorithm is capable of reaching a decision within 20–50 ms, that leaves sufficient time to implement the appropriate fully automated countermeasures.

The algorithm is ready to be implemented, as the researchers continue to work on the control and regulation of the relevant countermeasures. The development is of interest not only to the big operators of power transmission grids, but also to regional distribution grids. "To make an analogy with the road network, what's the point of having clear motorways when the smaller regional roads are permanently blocked?" said Bretschneider.

All the same, the researchers are not restricting themselves to the problems of today, but also want to factor in anomalies that have not even occurred so far. "If we continue to pursue renewables, it may lead to situations we don't even know about yet," said Bretschneider. Here, too, the researchers have turned to artificial intelligence, where they work on categorising these sorts of unknown phenomena and developing the appropriate algorithms using digital network maps.

Fraunhofer Institute for Optronics, System Technology and Image Exploitation - IOSB

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SELECTING THE RIGHT BLOWER TECHNOLOGY FOR OPTIMUM ENERGY EFFICIENCY

Energy is the largest operating cost in many industries, and with electricity prices continuing to rise, choosing a blower for optimum energy efficiency is important.

Energy is the largest operating cost in many industries. For example, in the wastewater treatment industry the energy consumed in running blowers for aeration is often cited as the largest of all the energy consumers.

With electricity prices continuing to rise, reviewing the energy efficiency of a blower is imperative in selecting the correct blower for any given application — especially when you consider that the energy costs of a blower can account for up to 80% of its total lifecycle costs. The type of system and equipment an operator chooses is therefore by no means inconsequential.

Various solutions are available for low-pressure systems and the right solution will depend on the specific application. The most common and widely used solutions are rotary blowers and screw blowers — each with their own unique strengths that are ideal under certain conditions.

Compression methods

Two different compression methods exist in principle: isochoric compression and internal compression.

Isochoric compression

Isochoric compression refers to the process whereby compressed air is delivered without having been compressed inside the blower block. The volume of air inside the block remains constant. This well-known method is the one used by rotary blowers.

The rotors inside the block have a continuous straight-line profile. Rotary blowers draw a certain volume of air into the working chamber, then rotate further to close this chamber and deliver the unchanged volume of air to the outlet side for discharge. The only reason pressure increases is because the compressed air flows back.



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THE LATEST SCREW BLOWER DESIGNS FEATURE A NUMBER OF ADDITIONAL TECHNICAL INNOVATIONS THAT IMPROVE THEIR EFFICIENCY BY ALMOST 10% IN COMPARISON TO FORMER DESIGNS.

What makes this possible is the aforementioned internal compression in the screw airend. Unlike those in rotary blowers, screw blower rotors are twisted and continuously reduce the air volume enclosed in the airend. In addition, screw blower rotors can turn at higher speeds, which improves efficiency.

More air and more savings with the latest screw blower technology

The latest screw blower designs feature a number of additional technical innovations that improve their efficiency by almost 10% in comparison to former designs. This greater efficiency results from a highly efficient screw profile design. The latest models also feature additional energy-saving technical innovations.

Earlier generations of these types of compressors usually had a separately driven oil pump with an oil cooler. Their purpose was to keep operating temperature within limits and ensure proper lubrication. However, such components consume power and have wearing parts.

The latest screw blowers feature an internal cooling concept that makes oil pumps and oil coolers superfluous. Furthermore, they feature an effective sealing concept that eliminates the need for the vacuum pump previously required to ensure long-term hermeticity. Eliminating such auxiliary devices and circulating oil lubrication also increases the service life of the machines.

A further feature of such screw blowers is that they are complete, ready-to-connect packages. This simplifies installation and reduces associated costs.

Selecting the right blower

Screw blowers are by no means always the most suitable choice for a particular application. Whether it is best to use a screw or rotary blower depends on various factors, all of which must be examined for each particular case.

Both volumetric flow rate and pressure have an impact on the design rating and therefore also power consumption. For example, if the required pressure can be reduced by only 100 mbar, power consumption is significantly reduced as a result. If, in addition, volumetric flow rate fluctuates with demand, a combined solution may be the most suitable alternative.

Rotary blowers can deliver air at up to 1000 mbar gauge pressure and have displacements of between 200 and 9000 m³/h.

Internal compression

Screw blowers on the other hand work on the principle of internal compression. Here the volume of air is reduced while it is inside the blower airend.

They have been available for a number of years and it has now become possible to apply the compression technology used for compressors — which normally covers higher pressure — to blowers.

Screw blowers typically deliver pressures of up to 1100 mbar. Because screw blowers normally operate more efficiently, their lifecycle costs can be up to 30% less than rotary blowers since power costs are lower.

- 4-1: Intake stage**
- 1-2a: Isochoric compression process - conventional blowers**
- 1-2b: Polytropic compression process - screw blowers**
- 2-3: Discharge against pressure**

Lower power consumption with internal compression and no overpressure

Excess consumption during overcompression

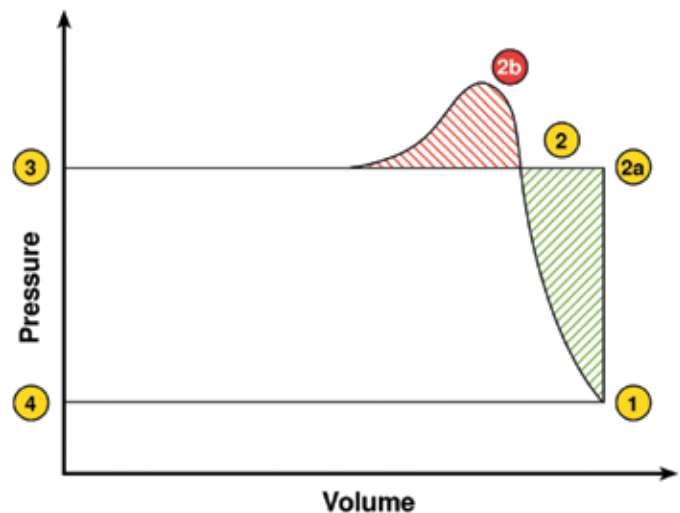


Figure 1: P/V diagram for displacement compressors.

As shown in Figure 1, screw blowers are best suited to applications where pressure demand exceeds a certain level; in such instances they offer significant energy-saving potential (green range in the figure). However, when operating pressure is too low; for example, significantly less than 1000 mbar, the risk of over-compression exists (red range). In such cases, rotary blowers may be the more suitable choice.

Other criteria may also be relevant, depending on the application. The air injection depth and service life of the blower are also important. For an air injection depth of up to 5 m, rotary blowers are often more suitable; above that, screw systems make more sense.

If the blower application calls for continuous duty — which is often the case for wastewater treatment plants — the amortisation period on the more expensive screw blower is very short. Although the initial investment is greater because the technology is more sophisticated, lower energy costs quickly offset the higher up-front investment costs when the machines operate continuously.

Depending on the application and how long the compressors are actually operating, it may make sense to select a screw and rotary blower combination.

If several blowers are required for an air centre, the best solution may be to use screw blowers for continuous duty and rotary blowers to cover peak loads.

The importance of planning

It is not only important to consider the individual blowers themselves, but also to consider the entire system as a whole. As proven many times over, the combination of careful equipment selection and optimised interplay between all components within a system ensures best results every time. A single, high-efficiency blower cannot be effective if it is installed incorrectly. In fact, it is not enough to simply install the machines: it is also important to know how to control them and when to turn them on and off, enabling them to perform as effectively and efficiently as possible. Of course this requires meticulous planning prior to installation.

The best way to accomplish this is with an air demand profile that identifies the exact compressed air consumption over the

course of a year to establish the blower station's optimum operating point in regards to energy consumption. Of course the blowers need to be able to deliver the maximum volume of air required, but the system as a whole should provide best possible efficiency at the most common real-world operating point. The best solution can be determined using computer software that compares the efficiency of various blower combinations and the costs associated with maintaining them.

Blower block, power transmission, drive, auxiliary equipment, power electronics and controls: all of these components combine to deliver a complete, ready-to-run rotary blower, screw blower, turbo blower or whatever equipment is being used to deliver air. It's no easy task to pick the most efficient and robust solution from this variety of available options. It may therefore help to consult standards such as ISO 1217-C in order to avoid being misled by the so-called "coupling power" which is often stated. After all, what truly counts is not the power consumed by the individual blower block or airend, but that used by the entire system.

Conclusion

Before deciding on a system, it is important to precisely analyse the compressed air demand for the specific application in question. Once this has been done, the most efficient and cost-effective long-term solution can be identified.

It may well be that the system with the higher up-front cost is actually the most cost-effective over the long term when energy costs are taken into consideration. Any initial premium is generally paid back within one or two years. After that, operators save money year after year.

There is no doubt that both rotary blowers and screw blowers are both efficient solutions, and that each possess a number of advantages. However, which technology will be most suitable and efficient for any given application can only really be determined after conducting a precise demand analysis.

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RIGHT-ANGLED ETHERNET CONNECTORS

The EPIC DATA 90 RJ45 is a range of connectors that are made up of two parts, with the rear part being able to be fitted in four positions. Installation engineers are increasingly demanding angled connectors for Ethernet cables, so the EPIC DATA 90 RJ45 offers the versatility to rotate or change cable outlets in 90-degree increments easily in the field, designed to ensure reliable network cabling even in restricted spaces and avoiding strain on the bending radius of data network cables.

With its metallised housing and assembly without the need for special tools, the angled EPIC DATA 90 RJ45 is suitable for a wide range of applications. Cable strain can also be relieved using a cable gland with clamping ring allowing cable diameters of 5.5 to 10 mm. The connectors are designed for transmission rates of up to 10 Gbps, and as for the straight version, the angled connector meets the requirements for transmission category Cat.6A and is also suitable for PoE+ in compliance with IEEE 802.3at.

LAPP Australia Pty Ltd
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MODULAR MANAGED SWITCH

The Hirschmann MSP40 modular managed switch now offers 10 Gb uplinks via its 10GE module.

Based on module selection, the Hirschmann MSP40 is available up to a maximum of 28 Gb ports and includes everything from 10Base-T up to 10 Gb SFP+ connections in either layer 2 or layer 3 variations.

Its small size and rugged casing make the MSP40 suitable for industrial applications that have limited space, such as trackside or in underground mines. The MSP40 with 10 Gb uplinks is useful for applications requiring significant bandwidth while still requiring an industrial solution.



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DESICCANT AIR DRYERS

Designed for consistent pressure dew points, -40°C to -60°C, Oxair's desiccant air dryers eliminate water and freezing ice in low ambient temperatures. The system comes completely assembled, piped and wired with a full charge of activated alumina desiccant. The only thing that needs doing for operation is to hook the system up to the utilities.

The dryer is timed to switch towers based on a standard timing cycle. During the drying cycle some compressed air is used to purge/dry the depressurised desiccant offline bed. Oxair's desiccant air dryers are available in both electric and pneumatic control formats, and are PLC controlled with reliable HMI touchscreen. The company also offers conversions on customers' own air-drying equipment.



Air flows can be achieved from 100 SCFM to 10,000 SCFM, with pressures from 100 psi to 500 psi. Certified lifting frames are available as well as the multistage filtration system for maximum protection. AS-1210 or ASME V111 stamped pressure valves are available and the system has a super-quiet muffler for noise control.

Suitable for pipeline maintenance and other offshore industries are the Prism Cactus pc3010 membrane air dryer, a cost-effective solution for ensuring a continuous stream of dry air onsite in a wide range of remote and harsh environments or high-pressure desiccant air dryers with either a vertical or horizontal compressor.

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EMBEDDED COMPUTER

The Neosys POC-500 series of compact embedded computers offers four PoE+ ports, four USB 3.0 ports and a MeziO interface.

Featuring an AMD Ryzen Embedded V1000 4-core/8-thread processor, the product is said to deliver up to three times the CPU performance of prior POC series models, as well as 3.6 TFLOPS of GPU performance. Additionally, it includes an

M.2 2280 NVMe SSD to support four times the disk read/write speed of typical 2.5" SATA SSDs.

Measuring 63 x 176 x 116 mm in a DIN rail mounting chassis, the product has a wide operating temperature range of -25 to +70°C. All data ports come with a screw-lock mechanism to always keep cables secured.

The models are available in two CPU variants: the V1807B (45 W) variant is for high computing power demand, while the V1605B (15 W) variant is designed for rugged fanless operation.

Backplane Systems Technology Pty Ltd

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SMARTPHONE FOR HAZARDOUS AREAS

The Smart-Ex 02 is the next generation of rugged, intrinsically safe smartphones for hazardous and harsh industrial environments from ecom. Developed completely in-house, the smartphone features a large 5" display, an ergonomic design, scratch-resistant Gorilla Glass and 21 LTE frequency bands, making digital applications mobile beyond company boundaries. Global frequency bands and certifications allow users a wide range of applications worldwide. Whether it is used as a smartphone, PDA, scanner or camera, the Smart-Ex 02 enables mobile employees to perform their daily tasks anytime and anywhere.

Keys for push-to-talk, volume control and camera shutter release are well positioned to ensure that the Smart-Ex 02 is easy to use. User-programmable keys can be configured for user-specific requirements. Equipped with a powerful replaceable battery, the device can handle unexpectedly long shifts and runtimes of up to 24 hours.

With the latest Android 9 operating system, the smartphone operates quickly, safely and efficiently. It is said to be the first Zone 1/21 and Div. 1 certified device to meet the standards required for Android Enterprise Recommended (AER) validation by Google.

Pepperl+Fuchs (Aust) Pty Ltd

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TEMPERATURE DISPLAY/LOGGER

The Status Instruments DM650TM is a temperature display/logger designed to work with all types of temperature sensors and is powered by a user-replaceable lithium battery with up to two years' battery life.

Applications include the food processing and storage, pharmaceuticals, chemicals and beverage industries.

Features include a relay output for a high/low/deviation alarm with adjustable hysteresis and latching. The relay output can also be configured for a battery warning. The device has a 5000-reading integral memory, user-configurable display scrolling messages and an NFC android interface for starting a log and downloading logged data via an app.

The DM650TM also supports simple USB configuration and comes with free software and standard USB cable. It is available in IP67 ABS or a stainless housing for wall, surface or direct mounting. Versions are also available for 4-20 mA, voltage and pressure.

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MULTICORE AI EDGE CONTROLLER

The Aeon BOXER-8120AI compact multicore AI edge controller is a high-performance, low-power-consumption machine vision system with support for four IP cameras.

Utilising the power of the NVIDIA Jetson TX2 supercomputer, the product integrates hardware and software AI solutions into a single device. The NVIDIA Jetson TX2 is based on the HMP Dual Denver 2 plus Quad ARM A57 complex neural network processor to provide an AI edge platform with support for Linux Ubuntu 16.04.

The BOXER-8120AI is equipped with 8 GB of LPDDR4 system memory, four Gigabit RJ-45 Ethernet connectors, two USB 3.0 ports, two RS-232 ports and one OTG connector. An internal 32 GB eMMC 5.1 SSD storage device and an externally accessible MicroSD card provide operating system and data storage. A HDMI 2.0 output is provided for high-resolution displays.

The product is compact, measuring 135 x 30 x 101 mm. A wall-mounting bracket allows the computer to be conveniently installed in equipment enclosures.

The fanless design of the BOXER-8120AI, coupled with an operating temperature range of -20 to +50°C, ensures long-term operation in industrial and embedded environments. It can be powered from a 9–24 VDC source. An optional 100–240 VAC power pack is also available.

Interworld Electronics and Computer Industries

www.ieci.com.au

ETHERCAT TO MODBUS RTU GATEWAY

The ICP DAS ECAT-2611 EtherCAT slave to Modbus RTU gateway and protocol converter allows users to seamlessly interconnect devices between EtherCAT and Modbus RTU networks. It acts as a slave on both, allowing I/O data to be transferred between the two. The data exchange buffer that it provides gives easy and fast transfers, lending itself to a diverse range of applications.

The product can also be used to connect non-networked industrial devices and equipment to an EtherCAT system. It allows serial-based RS-232/422/485 industrial devices and equipment to be easily integrated into an EtherCAT control system without the need to make any changes to the industrial device.

The serial port interface supports Modbus RTU (Slave) protocol and RS-232/422/485 with a maximum baud rate of 115200 bps, and Modbus Function Codes 03, 04, 06 and 16.

ICP Electronics Australia Pty Ltd

www.icp-australia.com.au



LORA SENSOR NODE

The WISE-4610 sensor node provides convenient functions such as customised private/public networks and GPS positioning. It offers the advantages of LoRa networks in terms of long-distance, low power consumption, low interference and good penetration rates.

Providing wireless communication coverage of 5 km, the WISE-4610 also has a long battery life due to the low power consumption of the LoRa network. Additionally, the node's built-in solar rechargeable battery and 10–50 V external power supply eliminates power supply issues and allows users to continue using the device without frequent battery changes. For outdoor applications, the IP65-grade housing and the M12 waterproof connector provide the device with enhanced protection. DIN rail, wall, pole and stack mounting methods are available for node deployment in various locations and GPS support is offered.

The WISE-4610 can be used for applications requiring continuous long-term outdoor monitoring, long-distance transmissions and small-scale data flows. It is also suitable for urban infrastructure projects or factory sites such as water purification plants, water pumping stations, sewage treatment plants and outdoor pipelines. Other monitoring applications utilising the LoRa/LoRaWAN network can be easily implemented with the WISE-4610 to provide greater precision and detail. Automatic data collection and centralised management allows large-scale factory operations to replace conventional approaches such as manual recording and inspections.

Advantech Australia Pty Ltd

www.advantech.net.au

LASER MARKER

The Hitachi LM-C300 is available with two different power output levels — 10 and 30 W — and three different wavelengths — 9.3, 10.2 and 10.6 μm . It is designed to handle marking applications across multiple types of packaging materials including paper, corrugated cardboard, glass, rigid plastics, flexible foils and films.

The LM-C300 CO₂ laser marker in the 10.6 μm version makes good prints on paper and cardboard packaging and glass packaging. This light wavelength suits most packaging applications.

The 9.3 μm version is suitable for the marking of PET plastics. The surface is smoothly marked without the danger of pinholes or risk of cracking the internal structure.

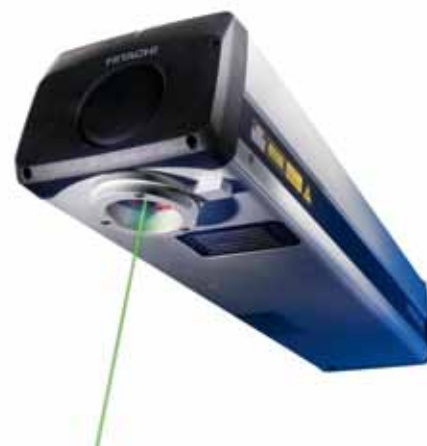
The 10.2 μm version is suited to marking on thin films and any types of packaging foils. Packaging materials that suit this laser light wavelength include PE, HDPE, LDPE, PP, OPP, OPA.MA, POM, PUR, ABS and PVC.

The laser marker adopts new design features for simple and intuitive operation. A new icon-based 10" full colour touchscreen features WYSIWYG message creating and operating environment. The touchscreen is easy to use in both handheld and on the equipment configurations.

Reliability is enhanced due to a new cooling system design where air is supplied through the whole laser tube at the heart of the laser marker. Blowing air out around the lens keeps particulates off the focal lens and keeps the lens clean. It reduces the loss of laser output for more stable marking. The housing of the laser is environment protected to the rating of IP54 for use in harsh environments.

Visy Technology Systems

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Traditional gas detection systems need to wait for the gas to form a vapor cloud, which may or may not ignite, and which may or may not allow loss prevention by enabling shutting down the gas facility in time. Ultrasonic Gas Leak Detectors (UGLD) respond at the speed of sound at gas leak initiation, unaffected by changing wind directions and dilution of the gas

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STAINLESS STEEL PANEL PC

The Winmate IP69K flat stainless P-Cap panel PC, the W24IB3S-SPA269, adds a 23.8" model to the range. Designed to be rugged, the line of stainless steel panel PCs is fully sealed to meet IP69K standards of protection against intrusion from dust and water, and the projected-capacitive touch screens support rain/glove modes for use in a range of different environments, including harsh, wet and dusty conditions. Additionally, this allows the screens to be easily cleaned and sterilised. Made of corrosion-resistant stainless steel and featuring an edge-to-edge flat screen design, the PCs are resistant to chemicals and reagents, and can withstand cleaning with water temperatures up to 80°C and pressures of up to 30 bar.

The projected-capacitive screen is resistant to scratches due to its glass cover lens, and touch features support 4-point multi-touch, easily controlled by fingertips to make every command simple and convenient. With the 23.8", 1920 x 1080 design, users can clearly see every aspect of their work. Other sizes in the range include 10.4", 15", 19" and 21.5" screens.

Backplane Systems Technology Pty Ltd

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IS ENCLOSURES

Pepperl+Fuchs has completely redesigned the GR series made of glass-fibre reinforced polyester for customised solutions in increased safety (Ex e) and intrinsically-safe (Ex i) applications. Many of the functions are updated and cast into a new design. Terminals and switching elements can be individually positioned on the 10 mm mounting rail without the need for an additional mounting base. Spacers ensure that every component can be mounted efficiently at different heights. This saves space and helps users incorporate more functions in one enclosure. The updated GR series can also withstand temperatures down to -60°C, so that it can be used for applications in harsh environments.

Mounting and maintenance is easier: decoupled installation steps allow even large and heavy enclosures to be installed by one person. Rugged hinge accessories and entry points for screwdrivers make it easier to open the enclosure lid, simplifying maintenance for the explosion-proof terminal boxes or control stations. Integrated edge protection is another feature that allows enclosures to be stacked safely and prevents damage to the gaskets during maintenance, ensuring that the IP protection remains effective.

Pepperl+Fuchs (Aust) Pty Ltd

www.pepperl-fuchs.com

15" HMI

The HG5G-V 15" HMI's TFT-LCD screen features a resolution of 1024 x 768 pixels and a brightness of 650 cd/m² to deliver good visibility, even in high-glare locations such as direct sunlight.

A wide operating temperature range of -20 to +60°C — as well as IP66F, IP67F, Type 4X, 12, 13, Class I Division 2 hazardous location and UL61010 approval ratings — assures operation in tough environments.

Support is included for over 100 serial and networking industrial protocols, such as Modbus RTU and Modbus TCP/IP. Up to four protocols can be used simultaneously, allowing the product to exchange data with many sources and systems.

FTP functionality allows users to configure the HMI as an FTP client or server for transferring programs, and for copying or moving files between local memory, an external memory device or a cloud-based file, database or data storage platform.

Web server functionality for HMI remote monitoring and control gives a user the same functionality as if standing in front of the HMI on the factory floor.

Direct control by the HMI is enabled by adding up to four expansion discrete or analog I/O modules. USB, Ethernet and SD memory card ports provide additional connectivity.

IDEC Australia Pty Ltd

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HIGH-TEMPERATURE ACCELEROMETER

Dytran Instruments has released the model 3262C, a high-temperature differential output accelerometer that operates at up to +649°C, and can survive temperature excursions up to 760°C.

Each aspect of this model is designed for high performance and extended durability in the harshest high-temperature environments. The case isolation, cooling channel, hermetically sealed super alloy Inconel 600 housing and patented Silver Window technology make the model 3262C suitable for permanent vibration monitoring of gas turbine engines, space applications, nuclear applications, gas and steam turbine power plants.

Dytran's Silver Window technology is a key feature of model 3262C. The window on top of the accelerometer housing allows diffused oxygen molecules to pass through at high temperatures, replenishing oxygen to the piezoelectric crystals while maintaining the hermetic seal integrity. This feature assures continued high-temperature operation with minimal loss of piezoelectric crystal insulation resistance due to oxygen deprivation.

The crystal design topology allows model 3262C to exist in rapidly changing thermal environments by exhibiting a high resistance to thermal shocks. The internal components of model 3262C are made from high-temperature alloys that are tuned to a perfect match of thermal coefficients of expansion to stabilise temperature response characteristics. The sensing element is electrically isolated from the external case to avoid signal ground loop interference.

Basic sensitivity is 5 pC/g, the frequency response is $\pm 10\%$ to 5 kHz.

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CHOOSING RFID FOR INDUSTRIAL APPLICATIONS

Mark Sippel, Product Marketing Manager, Balluff, Inc.

The three most widely available RFID systems offer differences in performance for different application scenarios.

Choosing the proper radio frequency identification (RFID) system for use in industrial applications like machine tools, palletised assembly or production tracking can be a confusing task these days. With all the information floating around about HF, UHF, microwave and GPS-based systems, and whether to use active or passive tags, it may seem like these systems can be used almost anywhere. However, failures because of a wrong or unreliable system can be very costly — many times in hundreds of thousands of dollars or more. Today, RFID is designed for many environments besides industrial environments, which can make it confusing as to what systems work the best.

Most RFID systems utilise the same basic hardware. This consists primarily of a read/write head (also known as an inter-

rogator), coupled with a tag (also known as a data carrier) that is used to remotely carry data of some type. There is usually a processor used to convert the data from the tag to a common interface or bus in order to control processes or move data to or from databases. Depending on the system design, the processor may be remote from the head, allowing greater flexibility and smaller size, or it may be combined with the read/write head.

Low frequency

LF systems, as they have become known, generally operate from 70 to approximately 500 kHz. These systems can vary greatly in cost depending on how proprietary they are. LF systems are typically station-based. This means the tags have data read and/or written to them at a specific 'checkpoint' in a process,



typically by a read/write coil or head. These systems are also commonly used as read-only systems for the purpose of data tracking only.

A read-only system typically uses a pre-programmed individual serial number normally no more than 5 bytes in data capacity. This data is used by a control system to track a transportation device such as a pallet. As the pallet with the tag moves from the beginning to the end of a process, the serial number is then associated with the part it carries during WIP (work in process), allowing data, generated during the process, to be collected in a central database referenced to the serial number on the tag. When the pallet is returned to the beginning of the process for a new part, the serial number is re-associated with the new part and the tracking process starts over again.

Most read/write versions of LF tags are limited to less than 200 bytes in data capacity, but allow you to write data to and from the tags when required. Many LF tags utilise an EEPROM (electronically erasable programmable read-only memory) and are therefore limited to around 100,000 write sequences, but can handle unlimited read sequences. To conserve memory, many control systems will use binary-based values like pass/fail data to maximise the data capacity available on a tag. This also helps to minimise the amount of data requiring transmission, allowing for minimal dwell times at any one read/write station.

Most LF systems are based on inductively coupled technology. These systems are also known as passive and typically do not contain a power source like a battery. Instead, inductive coupling (based on Faraday's law) powers the tag using energy generated from a coil in the read/write head to induce a voltage in the coil, thus powering it (Figure 1).

Data transmission is typically done by changing one characteristic of an alternating field used to power the tag. For example, some manufacturers will use pulse code modulation (PCM) to carry the data. This helps make the tags' data less susceptible to interference from other frequencies or simple magnetic forces.

LF systems can provide long-range performance — as much as 70 to 150 mm on non-alloy surfaces, and as much as 50 mm mounted on or in metal. For example, on a transportation pallet, there is less power degradation when the LF system is mounted on, or flush mounted in, a metal alloy. Due to the nature of a low-transmission frequency, an LF system typically has the longest transmission time for a given block of data compared to HF or UHF systems. For example, to read a block of 4 bytes or 32 bits of data, a read process can take 180 ms or more. To write the same 4 bytes of data can take 300 ms or more. LF systems are typically not used in applications that require moving read/write or 'on the fly' operation.

High frequency

HF systems typically operate at 13.56 MHz. These systems are usually based on either the ISO 14443 (also known as the Mifare standard) or the ISO 15693 standard. The benefits of these standards are that they can allow interoperability between several manufacturers of tags and read/write hardware, though both standards allow the user to openly read the tags' unique serial numbers. Typically, most 14443-based tags have the user data memory password protected, ensuring that the user data can only be read by the manufacturer's hardware. Most of the time, the password is not accessible to the user.

Because of this standardisation and commonality of hardware like tag transceivers, HF-based systems also provide lower cost for the user than proprietary systems and can be comparable in cost to LF tags. HF systems are also generally station-based like LF systems, where tag data is read and/or written at a specific checkpoint in a process.

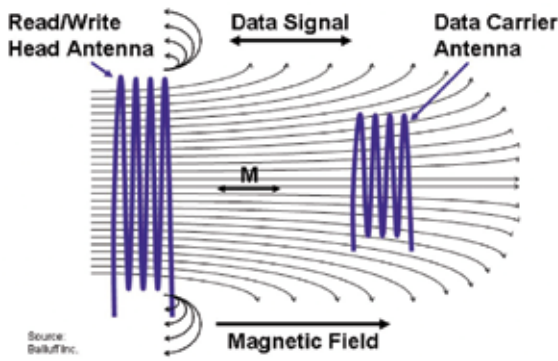


Figure 1: Inductive coupling example.

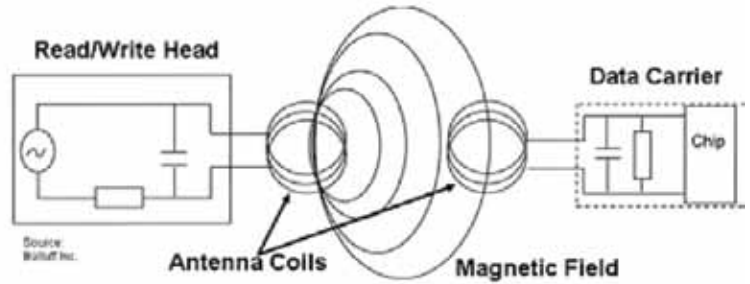


Figure 2: Near field inductive coupling antenna example.

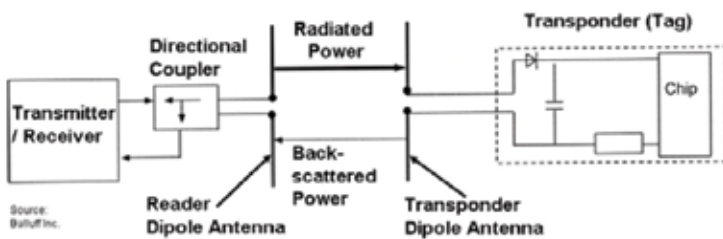


Figure 3: Back scatter dipole antenna example.

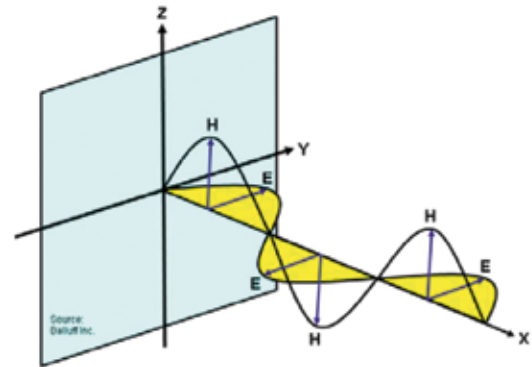


Figure 4: Electromagnetic wave propagation.

Unlike the LF-based tags, HF tags typically see significant read/write signal degradation when mounted in a metal alloy, thus limiting their range unless designed specifically for this purpose. HF read/write ranges can also be degraded by having metal in or near the field created by the head. There are exceptions where some manufacturers have created special tag and head antenna designs, allowing minimal effects from metal. These special tags and heads can use techniques like rod-style antennas instead of coil antennas.

HF systems also have good range, as much as 150 mm or more when mounted on non-metal alloy surfaces. The range for HF tags mounted on or in metal is usually manufacturer-specific. Because of the nature of their higher transmission speeds, HF systems can read/write tag data considerably faster than LF systems. For example, to read a block of 16 bytes or 128 bits of data, a read process can be completed in 30 ms or less. To write the same 16 bytes of data can typically be completed in 60 ms or less.

HF tags are also available in two memory types — EEPROM with 800 bytes or less of user data memory capacity (like LF tags) or FRAM type. FRAM (Ferroelectric random-access memory) typically offers high memory capacity — 2 kilobytes or more — and is not limited in write cycles, making it capable of essentially unlimited read and write operations. Because of their higher read/write speeds, HF systems can be used for

applications that require continuous movement at speeds of 3 m/s or more, depending on the amount of data being transferred.

Because both LF and HF systems operate on the principle of inductive coupling (Figure 2), they operate in what's known as 'near field'. This means that these systems are less susceptible to interference from other adjacent systems and minimal distances are required between read/write heads compared to other RFID system types.

Ultrahigh frequency

UHF systems typically operate between 865 and 960 MHz. Unlike LF- or HF-based systems, UHF systems are based on an operating principle known as 'backscatter coupling' (Figure 3), where the reader uses a dipole antenna that transmits electromagnetic waves, creating mostly magnetic power which is modulated and reflected from the dipole antenna of the tag (sometimes also referred to as a transponder).

This electromagnetic wave propagation is used for data transmission (Figure 4) and powering the tags, thus making them passive. Unlike inductive-based systems, where the propagation waves transect (example seen in Figure 4, wave patterns E and H), the signal can create a dead zone where a tag may not be powered or detected. Most UHF systems today are based on Gen 2 (second-generation) hardware and the tags will comply with the EPC (Electronic Product Code) data and memory standards. Gen 2 provides multiple frequency capability from a system based on what part of the world the system is located, making these systems very flexible in complying with international radio spectrum frequency usage restrictions. The EPC standard allows the data written to the tag to be referred to a common database to describe the product the data represents, similar to its UPC (Universal Product Code) barcode-based counterpart.

Some of the advantages of UHF over its LF or HF counterparts are that it can be used for much longer read/write



IT CAN BE CONFUSING TO DECIDE WHAT TAG TO USE IN A GIVEN APPLICATION. MOST RFID MANUFACTURERS, ESPECIALLY THOSE THAT SUPPORT MULTIPLE RFID FREQUENCIES, WILL PROVIDE RECOMMENDATIONS FOR WHERE TO USE EACH TAG TYPE.

Definition	Frequency	Characteristics
LF - Low Frequency	70-500 kHz	Short to medium read ranges, slowest read/write speeds, inexpensive, limited memory capacity, metal alloy resilient
HF – High Frequency	13.56 MHz	Short to medium read/write ranges, fast read/write speeds, inexpensive to expensive, mid to high memory capacities
UHF – Ultra High Frequency	865–960 MHz	Long read/write ranges, fast read/write speeds, inexpensive to expensive, limited to lower memory capacities

Table 1: RFID frequency ranges.

Functionality	Read-only or read/write – Data tracking or tracking and traceability.
	Mounting surface compatibility – Metal, plastic, etc. and product contents: liquids or solids.
	Data Capacity – a Few or many characters (typically in bytes).
	Survivability – a Temperature, environment (indoor, outdoor), vibration, shock.
	Bus Communication – Ethernet, fieldbus, serial, etc.
	Support Software Requirements – Middleware, database, PLC or controller software, security, etc.
Form factor	Tag Mountability – Dimensions, mounting holes.
	Read/Write Head Mountability – Dimensions, mounting holes, connectivity.
System costs	Tag costs – Throwaway vs. re-usable; total number of tags.
	Read/write (interrogator) hardware – Read/write head and processor costs, mounting hardware.
	Software infrastructure – Server needs, control programming (PLC, controllers, etc.; ERP and database support, etc.
	Engineering/Design – Site surveys (internal, external services).
	Maintenance Service – Tag replacement, software updates, modifications (long term).

Table 2: RFID project considerations.

distances reliably – as far as 4 to 5 m – and sometimes farther depending on antenna and tag designs. Because of the nature of the propagating wave transmission method, UHF can also be reflected off conductive or partially conductive surfaces like metal, water, concrete, etc. This reflection property can be helpful by causing the waves to be redirected around objects allowing greater flexibility, for example when locating and reading tags while mobile from a forklift. But this can also be a disadvantage when trying to isolate a specific tag when a large quantity of tags is present in the field. The system will detect all of the tags in its field and can make isolating a specific tag difficult. It can also lead to reading the wrong tag because of reflected waves from another location. Newer near-field forms of UHF are entering the market that may help resolve this condition.

Read and write speeds with UHF can vary greatly and many vendors claim reads of 20 to 1000 per second can be achieved. But be careful, as these claims can be misleading. There are many factors that can significantly reduce the reliability of such claims. A read rate is typically defined as the ratio of the number of times a tag is read per number of seconds reads were performed. Many times the only way to determine a reliable read rate is to perform a site survey and actually test the system's performance with the environmental factors that can affect read rate performance.

Most UHF tags are divided into two memory spaces. There is typically an EPC space only, but some also have a user memory area. Many lower cost tags are limited to 96 bits of data for the EPC data with no user data memory. There are tags becoming

available now with user memory, but are generally limited to less than their LF or HF counterparts.

Criteria for choosing an RFID system

It can be confusing to decide what tag to use in a given application. Most RFID manufacturers, especially those that support multiple RFID frequencies, will provide recommendations for where to use each tag type.

Choosing an RFID system can seem daunting. With each passing year, more options become available. The three options presented are the three most commonly available today. Due to the nature of the infrastructure required to implement even a small RFID installation, choosing the wrong technology will have expensive and unreliable data collection consequences.

When selecting the correct technology, several factors should be considered. Each of the factors discussed should be weighed based on the relevance to your installation. The best recommendation is to not look at cost alone. After all, the most important part of an RFID system is its ability to move and store data reliably. Without reliable data, everything else is inconsequential. Table 2 shows a list of recommended factors to think about before even considering a vendor. If these factors are difficult to determine, it is always recommended to seek out an integrator or advisor with RFID experience to help guide you through the factors involved.

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**HIGH-PRESSURE
COMPRESSORS**

The Orkan high-pressure air-cooled compressor series from Sauer Compressors comprises oil-lubricated piston compressors and gas compressors of up to 110 kW for final pressures of up to 500 bar(g). Booster solutions with inlet pressures of up to 16 bar(g) are also available. The series will be available within the first quarter of 2020.

The Orkan series is based on a modular system. Various designs are ready to cater for special requirements. There are hermetically gas-tight and explosion-proof versions for helium, natural gas and hydrogen. In the hermetically gas-tight compressors, Sauer uses a type of magnet coupling that provides absolute gas-tightness and has low maintenance requirements.

The Orkan's CubeCooler technology, with the coolers arranged radially around the combined fan and flywheel, enables recooling temperatures that are more than 30% lower than previous designs.

Sauer's range of high-pressure compressors of up to 500 bar(g) now covers the entire range of 4 to 230 kW.

CAPS Pty Ltd
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ETHERCAT PCIe MODULE

The ECAT-M801 from ICP DAS is an EtherCAT PCIe module that provides motion control up to 32 axes, connectivity with up to 64 slave nodes, and SDO + PDO slave operation.

It can provide multi-axis motion and I/O control functions via its own in-built CPU to reduce the load placed on the corresponding PC for maximum computational efficiency. It is also capable of multi-axis linear interpolation, 2D/3D interpolation and helical interpolation. 13 DI and 13 DO are included, as are two onboard encoder interfaces with compare trigger output.

APIs are provided for CiA402 servo drives and ICP DAS stepper motor control modules.

Modules from the ECAT-M801 line are compatible with both slaves from ICP DAS and EtherCAT slaves from third-party sources.

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



PROFISAFE FIELD I/O SYSTEM

The Safety Field Box system with universal device interface from Schmersal features an 8-pole M12 connector and is compatible with a wide range of safety devices including electronic and electromechanical safety interlocks, switches, sensors, light curtains and operation panels. Safety devices from other vendors can also be connected easily with an adapter, further adding to the available device types.

The Safety Field Bus solution has the advantage of being simple and flexible, with inbuilt signal diagnostics, leading to lower installation and commissioning costs. The flexibility is due to the ability to create a decentralised and free topology with simple connection of power, with plug-and-play device installation with up to eight devices per SFB.

The configurable safety field box allows safety switchgear devices to be connected in the field and freely interlinked on a decentralised basis. Straightforward connection allows for quick and failsafe installation.

The power supply to the field box is via an M12 power connector with a current carrying capacity of 10 A. The cable section of 3 mm² allows for simple installation of the field boxes in series with a single central power supply.

Profinet and PROFISafe devices can be connected in up to PL e/Category 4/SIL 3 applications. An integrated web interface is available for displaying status and diagnostic data.

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COMPRESSOR CONTROL SYSTEM

Kaeser Compressors has released the latest version of its Sigma Air Manager, its master control system for compressed air production and treatment components. SAM 4.0 optimises pressure values, automatically adjusts compressor system air delivery to accommodate fluctuating pressure demand and optimises system efficiency based on control losses, switching losses and pressure flexibility. Moreover, the end user can take advantage of services such as Sigma Smart Air for predictive maintenance. These features are designed to not only boost efficiency, but also reduce energy costs.

SAM 4.0 takes advantage of Kaeser's adaptive 3-D^{advanced} Control, which takes into account additional factors, aside from switching losses (start/stop), that affect compressed air system energy efficiency. These include control and idling losses, frequency converter operation and pressure flexibility (average increase above required pressure). The optimisation method predictively calculates the optimum achievable configuration and adjusts the connected components accordingly, based on the specific pressure required by the user.

The product supports operation in 30 languages, while the easy-to-use 12" colour touch screen shows at a glance whether the station is operating in the 'green zone' from an energy management perspective. Operating status, pressure history, free air delivery and power consumption, as well as maintenance and any error messages, can be easily displayed and analysed — both in real time and retroactively. Using a PC and network connection, this data can be accessed conveniently from anywhere, not just at the machine itself.

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SAFETY INTERLOCK SWITCH

IDEC Corporation has released its HS1T interlock switch with solenoid, which provides 5000 N of locking force, with many features included to maximise protection in machine and equipment guarding applications.

The high locking force of the HS1T is achieved in a compact size due to a metal head integrating the locking and mounting functions, an improvement over older designs where the head could break away from the mounting body. Also, to maximise installation options, the remaining actuator portion can be independently rotated from the high-strength head using only one screw. With a slim form factor and so many mounting options, the HS1T can be installed virtually anywhere, providing greater flexibility for designers.

IDEC has also included three independent rotary cams, instead of the single cam used by conventional devices. Two cams control the locking mechanism and one drives the door monitor contact. This arrangement provides redundancy, additional strength and ensures the monitoring function continues to work even if a locking cam is damaged.

The HS1T meets the requirements of ISO 14119:203 for Lock Monitoring and is marked as such. This means both the status of the position and the locking function of a protective door can be monitored through the lock monitoring contact.

There are also multiple cable entry ports, with faster and more reliable wiring connections made possible by spring clamp terminals. Designers can choose from spring lock or solenoid lock styles, with several options for contact configurations, as well as IP67 and Type 4X indoor-use-only ratings.

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ETHERNET CABLES FOR ENERGY CHAINS

CC-Link IE technologies offer seamless data exchange on all levels of a production facility, from the highest control level to the manufacturing levels. The CC-Link IE controller network has been designed for the rapid exchange of large amounts of data in a factory or production plant, while the CC-Link IE field network has been optimised for connection of a wide range of devices and their connection to other existing networks such as the standard CC-Link. These increasing requirements for industrial Ethernet communication nodes call for a secure and long-lasting connection between the components to meet the continuously growing amounts of data being transferred.

The igus CFBUS.045, CFBUS.PUR.045, CFBUS.PVC.045 (CAT5e) and CFBUS.049, CFBUS.PUR.049 and CFBUS.PVC.049 (CAT6) series of Ethernet bus cables are designed to withstand over 76 million strokes and a bend radius of 9.5 x d. They have also been certified by the CLPA CC-Link Partner Association after extensive electrical tests. The cables also have the increased 600 V UL certification.

Treotham Automation Pty Ltd
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**NEW
PRODUCTS**

COMPRESSOR

The BOGE S 111-4 anniversary compressor integrates the traditional status notification into the body of the machine as an easily visible light strip. The LED bar at the upper edge of the compressor indicates any anomalies, even in large production halls. BOGE has also equipped its anniversary machine with numerous efficiency improvements as standard: the IE4 motor ensures the current possible maximum degree of efficiency for the drive. The specific power consumption of the S 111-4 has also been improved. The machine is available with direct drive and frequency control.

The compressor has been fitted with super-soundproofing as standard providing a sound level of 67 dBA. Normal conversation is therefore possible next to the running compressor, and adjoining office spaces or production workplaces do not require any additional noise protection. With a drive capacity of 110 kW, the anniversary machine is designed for deployment in medium to large industrial plants. A direct drive, few built-in maintenance parts and a low speed of 1500 rpm make the S 111-4 low-wear and low-maintenance, and therefore also durable.

Boge Compressors Ltd
www.boge.net.au



ETHERNET MEDIA CONVERTERS

Schmidt Electronics ethernet media converters are designed for operation in harsh industrial or outdoor environments. Housed in small rugged multipurpose enclosures that can be DIN-rail or wall mounted, the converters are suitable for application in space-constrained critical environments.

The media converters support both switch mode and converter mode operation with advanced functions such as Link Fault Pass-through (LFP) and far end fault functions on the fibre (Fx) port and transient suppression on the RJ45 (Tx) port.

The media converters can be powered from an AC or DC power source. Screw terminals are provided allowing 18–36 VAC or 12–60 VDC to be connected directly to the unit.

The converters can tolerate operating temperatures from -40°C to +75°C to maintain reliable network connections in harsh environments.

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'Sky depot' boosts efficiency with smart stacking cranes



In major trans-shipment hubs like Singapore, there is a great need for facilities that can store empty containers. Cogent Logistics, an important player in the warehouse logistics industry, opened a pioneering sky depot as a direct response to this need.

Cogent One-Stop Logistics Hub's towering structure confronts the challenges of land scarcity and high operating costs in Singapore. Perched atop it, 110 metres above the Jurong and Tuas industrial areas, is the hub's groundbreaking rooftop container depot. Opened in 2016, this latest expansion of the facility enables Cogent to support customers with a full range of services including transportation, warehousing management and container depot management.

But as warehouse and container depots are typically situated either portside, near railways or other transport hubs, finding an effective concept for a rooftop depot was an especially complex and demanding process. The task of acquiring the right lifting technology was no exception.

Now in active use, the 15-high heavy-duty electric overhead traveling (EOT) cranes of the depot have a lifting capacity of 12 tons — suitable for empty container handling. Added smart features such as target positioning, hoist synchronisation, hook levelling and energy-saving regenerative drives help the crane operator handle the containers safely and efficiently.

For an overhead crane to operate seamlessly and efficiently from a rooftop, the facility needed to apply a particularly innovative lifting solution, explained Jian Yong Lee, spokesperson at Cogent Container Depot.

"Although many of the existing features of our cranes mirror that of cranes used in ports and terminals, our container depot has lower tonnage empty containers, tight space limitations and a significantly

higher handling height. Customisations to the taxi speed, anti-sway and target positioning systems also had to be made to suit our requirements," Lee said.

To procure the cranes that would fulfil such unique specifications, Cogent needed a technology partner, not just an equipment supplier. Taking on this special project required thorough risk assessment, according to Ryan Wang, Regional Sales Manager, Industrial Cranes SEAP, at Konecranes.

"We had to apply our technology from a different perspective and know our own limitations well enough to take up this project," said Wang.

Lee said that Konecranes worked collaboratively with Cogent to understand the requirements for their unique container depot. "They provided recommendations throughout the project that helped us to develop a suitable solution," he said.

"Konecranes is one of the few vendors that is

open, innovative and flexible enough to challenge norms and address new industry problems and requirements."

By incorporating a warehouse and container depot in one hub, Cogent Logistics has effectively sped up the transport cycle by doing away with one trip per cycle. Shipping containers collected from the integrated depot can be delivered to the warehouse within minutes, cutting waiting times significantly.

This abbreviated flow of operations also means that the hub can manage higher volumes within the same amount of time, translating to savings for the shipping lines Cogent serves.

"Our initial challenge was adapting to this new form of operation flow. Therefore, it helps to work with vendors who are able to bring solutions to us that are safe, reliable and innovative," said Lee.

The hub's operations also benefit from Konecranes TRUCONNECT Remote Monitoring, which makes use of sensors installed on the cranes to gather data on their operation. The data includes operating statistics such as running time, motor starts and work cycles as well as safety-related issues like emergency stops.

"TRUCONNECT has given us a platform to keep track of our equipment utilisation frequency and running hours. This is useful for monitoring and planning operational work, to monitor run times of the equipment and keep logs for better detection of any abnormalities on the cranes," Lee said.

"Expected downtime to perform crane servicing or maintenance can always be arranged at reasonable notice to minimise operational disruptions. Good communication with the Konecranes team is always appreciated."

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EMBEDDED PC

The Aaeon BOXER-6750 is a high performance standalone embedded PC featuring a sixth generation Intel Core i3 or Celeron processor, fanless operation, compact size, robust construction and DIN rail mounting.

The BOXER-6750 is based on the System-On-Chip chipset. Processor options include the Core i3-6100U or Celeron 3955U. It is also equipped with one SODIMM socket supporting up to 16 GB of DDR4 system memory, two Gigabit RJ-45 Ethernet connectors, four USB 3.0 ports and four RS-232/422/485 ports. A 2.5" SATA hard drive or an mSATA SSD can be internally mounted for operating system and data storage. System expansion is possible via two full-size Mini-Card slots. The onboard Intel HD graphics engine supports high-resolution displays and provides HDMI and VGA output.

The heatsink and fanless design of the BOXER-6750 coupled with an operating temperature range of -20 to +60°C is designed to ensure long-term reliable operation in industrial and embedded environments.

The BOXER-6750 can be powered from a 9–30 VDC source. An optional 100–240 VAC power pack is also available.

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LINEAR AXIS CONTROLLERS

In its drylin product range, Treotham has been offering lubrication-free igus linear axes with matching stepper and DC motors for several years. For an easy control and operation of the axes, the D3 dryve now offers users a control system for simple movement and the D1 dryve a control system for more complex tasks. This allows a variety of tasks to be automated without programming.

The D3 control system is suitable for all standard DC motors. Simply connect to the 24 V power supply and parameterise the operating mode, end position switch off, acceleration and the motor via the DIP switch. The speed can be adjusted with a rotary controller, while the current limiting is done by means of a screwdriver. After a few simple steps, the control system can already be put into operation. An LED display indicates the current status of the control system to the user via various colours. Small and medium-sized companies without programming skills can therefore use motorised linear axes.

With the D1 dryve control system, the user can operate the motor control system easily via a web browser on a fixed PC or even on a smartphone or tablet. A clear interface helps the user with the correct parameterisation. The D1 dryve also offers networking, and has been designed to save space and can easily be mounted in switch cabinets on a DIN rail. This can then be connected via a WLAN router, so that the system can be controlled via a wireless device.

Treotham Automation Pty Ltd

www.treotham.com.au



SANITARY CONVEYORS

QC Industries HydroClean HC200 conveyors encompass a sanitary design for handling all types of applications including food products, medical devices, pharmaceutical and clean room industries, and wet and washdown environments. The HC200 conveyors offer a variety of options to fit the user's unique application.

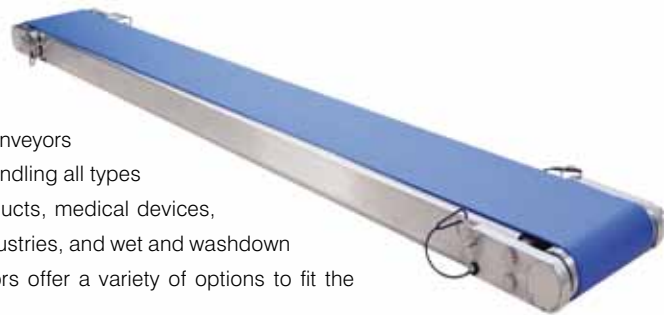
The stainless steel conveyors are purpose built for easy cleaning. Every conveyor can be disassembled without tools to simplify the cleaning protocol. The design ensures opportunities for bacteria to accumulate are minimised. The systems comprise sealed ball bearings, hex head fasteners, slotted frames and soft angles to promote drainage.

The unique tension release technology operates at the pull of a pin to relieve tension on the belt. Cleaning under the belt is quick and easy, with no tension or tracking adjustments required. Belt changes are simple and tool-less. Suitable antimicrobial totally encapsulated and plastic chain belting options are available.

All HC200 include crowned pulleys and V-guided belts for positive tracking, especially in wet environments. The systems operate at speeds of up to 1.5 m/s with loads up to 54 kg. Their 60 mm profile will fit in space-limited applications. The conveyors are offered with accessories to complement the product and complete the user's design requirements. These include stands, mounts, side and guides, drive packages and washdown gearmotors.

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The SK 200E NORDAC Flex is a decentralised drive unit with versatile installation possibilities. It offers scalable functionality and flexible configuration. The simple installation and maintenance of this unit is made possible through the plug-in capability and the easy parameter transfer using EEPROM memory. It is available in the power range up to 22 kW for wall or motor installation with IP55 or IP66 rating.

The product features torques, simple operation and commissioning, and is available for a range of applications. It can be used in packaging, logistics, food and beverage and pump applications.

Available in sizes up to 22 kW (although other models are available in sizes ranging up to 160 kW suitable for heavy-duty applications).

With IP ratings IP66 available it is suitable for washdown applications.

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INTERFACE DEVICES

The Turck IM12 interface devices now allow for the benefits of Turck's IMX12 series to also be available for non-intrinsically safe signals. The devices are compact, with a width of only 6 mm per channel, saving space in the control cabinet. Their modern electronic design provides a high degree of investment security.

The entire device series is certified for use in functional safety circuits up to SIL2. They process digital and analog signals from field devices, such as in the pharmaceutical industry or chemical industry. However, the IM12 devices also find suitable uses in factory automation, such as for temperature and speed measuring.

The parameterisable variants can be accessed via IO-Link and Pactware or other FDT frameworks. The power rail supply option using Power Bridge is available with all IM12 variants. When using IM12 and IMX12 (for the Ex area), customers can thus make use of the same mounting, wiring and commissioning features — mechanically, electronically and in terms of software.

Turck Australia Pty Ltd

www.turck.com.au



CO₂ LASER CODING

Compact and powerful, the Domino D320i is designed to deliver a reliable and flexible CO₂ laser coding solution for high-speed and high-quality applications onto substrates including glass, PET, film and carton.

Utilising Domino's i-Tech technology, the D-Series provides a compact, IP65 (washdown-compatible), high-performing solution for the most demanding of applications. Its compact footprint makes it suitable for challenging space constraints and heavy integration within larger systems such as labellers, flow wrappers and carton formers.

The i-Tech scan head is the fastest of its kind without compromising on quality, according to the company. The RapidScan technology is designed to provide up to 20% faster speeds with the same laser power, avoiding potential requirements to move up the range for more challenging applications. It has the capability of producing multiple lines of text at 1500 characters/s (30 W model).

The modularity of the system means key components can be installed in the appropriate locations without compromising the user experience or requiring the application to suit the laser. These modular components are connected with quick-release connections, making changes quick and efficient.

The low running costs, permanent high-quality print and performance of the Domino D-Series laser makes it a suitable partner for a wide variety of high-performance industries including food and beverage, manufacturing and pharmaceutical.

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Weidmüller 

u-remote

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Weidmüller compact distributed I/O system "u-remote" is an advanced platform that's built to ensure faster installation and setup, and designed to improve performance and productivity. At only 11.5mm wide per modular slice, its slim design and high-channel density makes it one of the most feature-rich distributed I/O platforms available. Being vendor neutral, it supports integration with all major fieldbus networks including EtherNet/IP, PROFINET, EtherCAT, Modbus TCP, and many more for seamless compatibility with existing plant/machine networks. An integrated web server helps speed up installation and provides real time diagnostic access to up to 64 I/O slices/cards connected. Its high-speed system bus also provides impressive electronic performance and works with as many as 256 DI/DOs in just 20 µs cycle time. Let's connect.

www.weidmuller.com.au



RFID READ/WRITE HEADS WITH IO-LINK

The latest RFID read/write heads with IO-Link from Pepperl+Fuchs offer simplicity and flexibility, due to auto-start functionality that simplifies integration. Combining Pepperl+Fuchs Ethernet IO-Link master with the RFID read/write heads offers a complete, flexible solution. These devices offer an IO-Link interface (v1.1) in accordance with the international standard IEC 61131-9, which enables easy and cost-effective integration of read data into higher-level networks.

RFID IO-Link read/write heads operate in the HF range according to ISO 15693 and offer a read/write range of up to 13 cm. The housing designs are rugged and compact, suitable for use in harsh industrial environments. They come in three housing sizes, each with advantages based on the application need. A complete solution of RFID components and Ethernet I/O modules streamlines communication between all levels of automation, paving the way for Industry 4.0 applications. Each read/write head has a number of RFID tags to suit a variety of applications.

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

THIN CLIENT TERMINAL

The TPC-1551T thin client terminal is equipped with a 15" XGA TFT LCD, low-power Intel Atom E3827 1.75 GHz dual-core processor and 4 GB DDR3L SDRAM to deliver high-performance computing in a compact, fanless system. For enhanced durability, the TPC-1551T features a true-flat touchscreen with an IP66-rated front panel, die-cast aluminium alloy front bezel and 5-wire resistive touch control.



In addition to supporting a wide operating temperature range of -20 to +60°C, the TPC-1551T includes a full-size mini PCIe slot for extending the system functionalities to satisfy diverse automation application needs. In addition, Advantech's iDoor technology can be integrated via the mini PCIe slot in order to provide additional I/O connections, isolated digital I/O, fieldbus protocols, 3G/GPS/GPRS/Wi-Fi communication and MRAM.

The TPC-1551T is suitable for use in automation, data acquisition and related applications due to its extensive data handling capabilities and numerous connectivity options.

Advantech Australia Pty Ltd
www.advantech.net.au



SMART SENSOR FOR INDUCTION MOTORS

The ABB Ability Smart Sensor for induction motors and pumps makes preventive maintenance possible by accurately monitoring and analysing data on motor operation, including health parameters to warn against failures before they happen.

There is no need for wiring as it features built-in Bluetooth 4.0 technology

and can easily be attached to any 3-phase AC induction motor for quick configuration. Data from numerous Smart Sensors can be wirelessly collected via a smartphone app or ABB gateway to securely upload data to the cloud.

The measured vibration, temperature and other parameters can be analysed and converted into meaningful information. The results additionally can be displayed on a customer portal or ABB Ability Smart Sensor app via the user's smartphone. Users can gain a quick overview of overall motor condition and monitoring using simple 'traffic light' indicators. Other features include maintenance advice via alarms, alerts and reminders on how to optimise maintenance and save costs. Users can also track data over time for trends or access the data via CSV files for further analysis.

Control Logic Pty Ltd
www.controllogic.com.au



MINIATURE CONNECTORS

The Han 1A is significantly smaller than the previously smallest rectangular HARTING industrial connector, the Han 3A. Despite its small dimensions, the connector offers powerful solutions for all lifelines in industry. Thanks to the simple Click & Mate principle, users also save valuable working time during assembly.

The interface uses black plastic housings and can be equipped with coloured coding. It requires little space and is versatile, as it integrates contacts for data, power and signal transmission. In addition, it features a flexible connection technology that offers an optimum solution both for on-site installation — screw contacts — as well as crimp contacts for the pre-assembly of separate units. The combination of few basic elements results in simple and efficient interfaces, eg, for mechanical engineering, automation, robotics, medical, energy and traffic engineering.

Typical uses of the Han 1A include applications in which drives, sensors or other devices must be supplied with power and integrated communications.

In mechanical engineering, the connector provides suitable solutions when it comes to efficiently connecting tools and smaller machine modules such as heating and cooling units, fans, control terminals, lighting systems, drives and vibration conveyors.

The system is also flexible when it comes to protection against dust and water. Two components are all that's needed to quickly assemble an IP20 solution for use in protected areas such as the spars of machines and supply ducts. Housing elements or single-wire sealing mats create a water- and dust-proof IP65 solution that can be used on grippers and other robotic tools in harsh industrial environments.

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AS I SEE IT



THE EVOLUTION OF MOBILE FIELD TOOLS

Did you know that, according to GSMA real-time intelligence data, there are more mobile phone connections than there are people in the world today? While not everyone has a mobile phone, the use of mobile devices continues to grow with almost 90% of Australia's population unique mobile subscribers.

We see these devices — which include mobile phones, tablets PCs and even IoT devices — used in almost every aspect of our daily lives. When it comes to factory and process automation, it's no different. The use of mobile tools to facilitate ease in accessing field device information and plant equipment has increased drastically in the last few years, and with continued improvement in both form and functionality, will continue to do so in coming years.

The evolution of these devices in the last 10 years alone has been staggering. While not quite comparable to the dizzying range of Apple iPhones, we're seeing new devices enter the market offering what feels like leaps and bounds in additional features when compared to older devices.

If you're looking to add a new mobile tool in your repertoire or upgrade an existing device there are several important aspects to take into further consideration. While most devices do perform core functions similarly, it's important to consider additional benefits some devices are now offering. Some key points to consider are usability, setup and maintenance, vendor and protocol independence, and cross-functionality.

Usability: As our phones have gone through the transformation from keypad to touch screen, it's expected that our tools should do the same. Beyond being intuitive to use, touchscreen functionality also allows for a much more compact and transportable device. The downfall to this of course is the increased risk of screen breakage. If you're looking at investing in a touchscreen mobile tool, it is important that the device is also ruggedised.

Setup and maintenance: A major downfall of older devices is the need for set-up and ongoing maintenance. This not only wastes time in the field but also becomes an ongoing cost. Devices with pre-installed drivers and device libraries are beneficial. Another highly valuable feature available on some devices today is automatic driver updates, which will greatly reduce both time and cost for ongoing maintenance.

Vendor and protocol independence: Almost all sites today use a variety of instruments from different manufacturers. It's crucial that the chosen mobile tool can support all devices you have onsite. One single 'Swiss Army Knife' device would be ideal, reducing the need to carry multiple tools in the field and reducing overall training effort for site personnel.

Cross-functionality: As day-to-day business continues to be digitised, it's expected that users will demand cross-functionality of assets. A device configuration that runs on a modern, supported operating system such as Windows 10 can also run and install other required software, ensuring it can also be used as an everyday work tablet or laptop.

Although only a few devices currently offer these benefits, it is expected that they will eventually become the industry standard. When we look at what these mobile tools are capable of, it's clear to see that they will be playing a crucial role in supporting the needs of process automation professionals.



**Sara Salehi is an Industry Manager at Endress+Hauser Australia, helping customers to improve their products and manufacture them more efficiently. She has a wide range of experience in engineering, research and development of processes using advanced analytical methods.*



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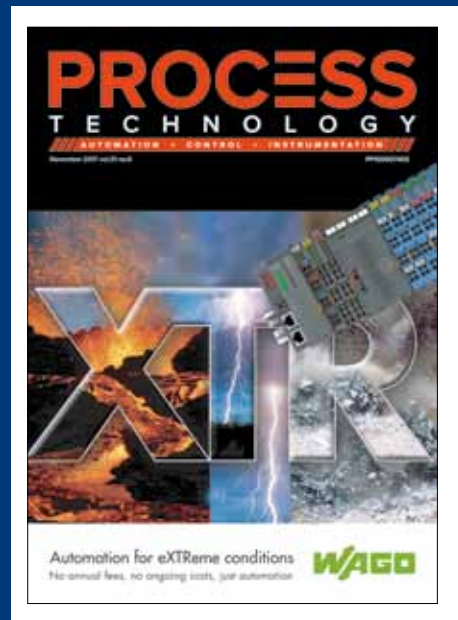
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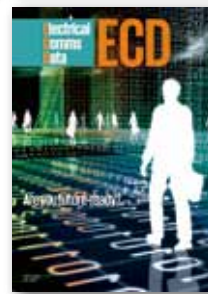
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