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AUTOMATION CHEMICAL ENGINEERING

Issue 30 2022

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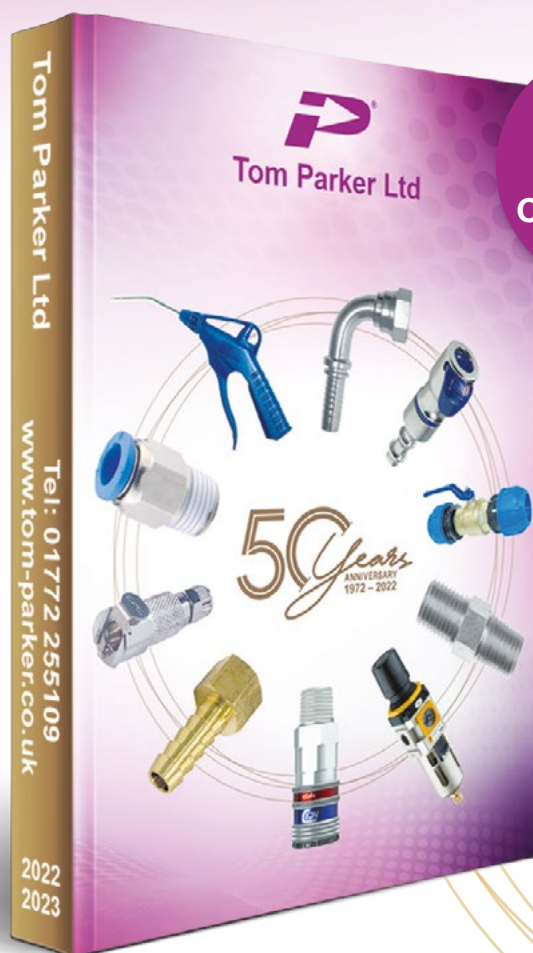




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Scaling up production, fast

How manufacturers can increase productivity to meet growing demand

The IHS Markit/CIPS Manufacturing Purchasing Managers' Index (PMI) value for May 2021 demonstrated that UK manufacturing is growing at its fastest rate in almost 30 years. Manufacturers must increase production to capitalise on the record growth in new orders. However, scaling up production quickly without additional floor space and workers can be challenging. Here Dave Walsh, sales manager at precision drive system supplier EMS, explores how expanding automation holds the answer.

In the PMI, any reading above 50 indicates growth. The value announced for May 2021 was 65.6 – the highest reading since the survey began in 1992. The easing of lockdown has unleashed pent-up demand, causing a steep increase in production volumes.

The plentiful market provides hope for manufacturers to bounce back after the pandemic by using the high demand to make up for lost profit. To make the most of this opportunity, manufacturers must quickly ensure their facilities are ready to accommodate the influx of new orders.

ACCELERATE AUTOMATION

Scaling up production requires investment in high quality equipment. The benefits of automation are widely known, and most manufacturers aim to incorporate it into production to some degree. However, many of these targets have so far only resulted in plans, pilots or small scale automation projects.

In fact, research conducted earlier this year by supply chain specialist Balloon One found that the UK lags behind ten other nations with similar levels of manufacturing, including Sweden, USA and Italy, for robot density. The investigation also found that the UK falls behind in productivity levels, which is arguably due to lower levels of automation.

Investing in automated equipment is an efficient way to increase production, as it doesn't require the company to hire a large number of extra workers. In addition, it's possible to increase manufacturing productivity in the same floor space.



SELECT RELIABLE COMPONENTS

In order for UK manufacturers to profit from growing demand, they must widely rollout automation across the supply chain. However, not all automated machines are built equal, and the components engineered into their systems play a large role in their overall performance. Manufacturers must remember that automation is an investment, that must be thought through with care.

When scaling up production, it's important that manufacturers and design engineers don't look for quick fixes. The new machines implemented should be not only able to accommodate the recent rise in orders, but also continue to benefit production in the long run.

Therefore, it's important that automated machinery components, particularly their powering motors, are selected for reliability. An unreliable motor can ultimately lead to failure, but it's important to note that, before it even reaches that point, a motor can cause inefficiency. In fact, an inefficient motor can result in electricity running costs that account for 97 per cent of its lifetime costing.

Automated equipment should be designed with dependable motors, such as the DMN range of brushed motors, which are renowned for their high quality and long life, while remaining a cost effective solution.

The motors have an optimised brush design that allows intermittent operation over one million cycles, and a continuous operating life of 3,000 hours. This long life cycle is achieved while still delivering a high output due to the range's enhanced heat dissipation and resistance.

UK motor supplier EMS has a selection of sample stock of the DMN brushed motor range available for express delivery to accelerate development of automated equipment. EMS also has a selection of complementary gear heads, reduction ratios and encoders available to suit a variety of manufacturing applications.

After the challenges of the pandemic, the UK manufacturing sector is now seeing a sharp rise in demand. Manufacturers must prepare their factories to accommodate the increased volume of orders. Facility managers who widely implement automated equipment designed with reliable and cost effective components can quickly scale up production to meet rising demand.

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Pre-validated bioprocess vessels and CIP systems combine for hybrid single use facilities

Suncombe, the cleaning and critical process systems specialists, has announced the global release of the PureVessel™ range of systems, for sanitary and sterile liquid storage, preparation, thermal treatment and mixing. They are typically required in the biopharma sector, laboratories and research institutes.

The PureVessel range of systems, expands on a Suncombe range of vessels developed over the last 40 years and is certified to ASME and ISO/EN standards for processing biopharma products, complying with all relevant regulations. These systems have been developed to operate within the hybrid bioprocessing model, in which a bio processing facility employs a combination of single use technologies (SUT) and stainless steel multi use equipment.



One of the drivers for the transition to single use methodologies is the complexity of the clean in place (CIP) and sterilise in place (SIP) operations of stainless steel multi use equipment, to ensure that there is no cross contamination and all work is developed in a sterile state. There are many advantages in employing re-usable stainless steel equipment and in order to make this usage more practical, the company has developed a pre-validated version of PureVessels combined with its PureCIP™ or MobileCIP® equipment.

Operating with the Suncombe PureCIP or MobileCIP, to provide a pre-validated CIP/SIP cycle, every PureVessel can be individually 'plugged' into the automation system, allowing the CIP/

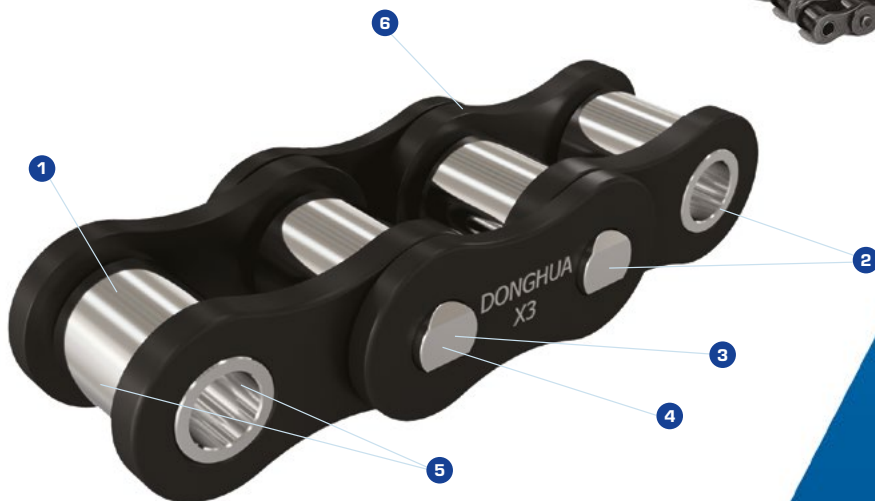
SIP to recognise the PureVessel being cleaned and select the optimum cycle for each vessel. On cycle completion an electronic and/or paper batch report, secured to 21CFR part11, is generated to accompany the clean/sterile vessel, to validate the result.

Available in capacities from 10 to 300 litres, the mobile or static PureVessels are modular built and can be equipped with top entry agitators, bottom mounted magnetic mixers, heating and cooling jackets, mounted on load cells, spray devices and instruments with the option of custom design and manufacture for specific requirements. The units are constructed from 316 stainless steel and Hastelloy for chlorine resistance.

Commenting on the release, Suncombe director Steve Overton said, "Combining the PureVessel unit and the Suncombe PureCIP and MobileCIP, provides clients with a pre-validated system, taking away many of issues and validation works. This simplicity of operation and 'plug and play' start up makes these the ideal combination for incorporating in a hybrid model of single use (SUT) technologies."



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COMMANDER S & MARSHAL

NEW MICRO DRIVE FROM CONTROL TECHNIQUES BREAKS FRESH GROUND IN INNOVATION AND TECHNOLOGY

Control Techniques, part of the Nidec group of companies, has launched the newest member of its Commander family. Commander S is the latest generation of micro drive that has its own revolutionary app interface named Marshal.

Commander S provides a unique solution for applications that require plug-and-play control convenience straight from the box. Its many on-board features make it easy to install, easy to use, reliable and cost-effective.

Commander S is the first drive to come with an app interface as a standard. Marshal reforms how the user interfaces with the drive making commissioning, monitoring, diagnostics, and getting support so easy. It's a game-changer in today's crowded micro drives market.

Powered by NFC technology, using Marshal the drive can be commissioned with the power on or even when the drive is still in the box with the power off. Parameters can be easily transferred from one drive to another by simply tapping the mobile phone to as many drives as necessary. Marshal has guided diagnostics, offering step-by-step guidance if needed. Drive configurations and wiring diagrams generated in the app can be easily saved and shared via email or any other messaging platforms.

Every drive is fitted with an NFC chip that allows configurations to be transmitted between the drive and the app instantly. The simple set-up routines within Marshal allow configuration of the drive in under 60 seconds, it's never been faster and the time-saving benefits are clear.

Commander S is the drive for the future, every detail of the design has been thoroughly thought through making it guaranteed to keep running, no matter what. In fact, it is so reliable Control Techniques are confident enough to supply it with a free five-year warranty.

Finally, a micro drive on the market that you can buy with confidence. Commander S and Marshal, what are you waiting for?

Interested?- controltechniques.com/commander-s

5
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NFC is in all our lives, for example, we use it to make payments at shops. We knew this was the technology to go for. It's disruptive for the industry and changes the whole customer experience. We are bringing innovation to the market with our constant development of products and surrounding services. We are proud of what we've achieved with this new drive.

Commander S gives you fast installation and programming, gets the job done, and it's green! This colour takes us back to our heritage, Control Techniques were known as the green drive company. And, as part of our ongoing development, we believe our heritage is important; what we take to the future is what we've learned in the past, and making it green is a mark that shows we've recognised all that knowledge and development over the years.

Anthony Pickering,
President of Control Techniques

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**CONTROL
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NSK Silver-Lube® bearings withstand wash-down fluids on bottling line conveyor

In operations where contact with process fluid is unavoidable, poorly specified bearings that fail prematurely can prove costly in maintenance labour and production downtime. For this reason, increasing numbers of food and beverage plants are turning to the beneficial attributes of NSK's Silver-Lube® bearing units. Silver-Lube® provides optimal protection against the ingress of wash-down water and detergent while simultaneously ensuring corrosion resistance.

Among those testifying to the advantages of Silver-Lube® is a market-leading milk processing and bottling plant. The facility was experiencing repeated bearing failures on five conveyor lines, where the company was changing bearings approximately every 16 weeks. With every replacement taking approximately one hour to complete, the plant invited NSK's team of experts to recommend a solution.

As part of its AIP Added Value Programme, NSK's specialist engineers analysed the failed bearings, concluding that the ingress of water during the wash-down process was causing internal corrosion and premature failures. Further review of the application and operating conditions led the NSK team to recommend its proven Silver-Lube® housed bearing units.



The plant commenced a trial of Silver-Lube® bearings featuring food-grade grease on one of its bottling line conveyors, a solution that resulted in an immediate improvement and significant lifetime extension.

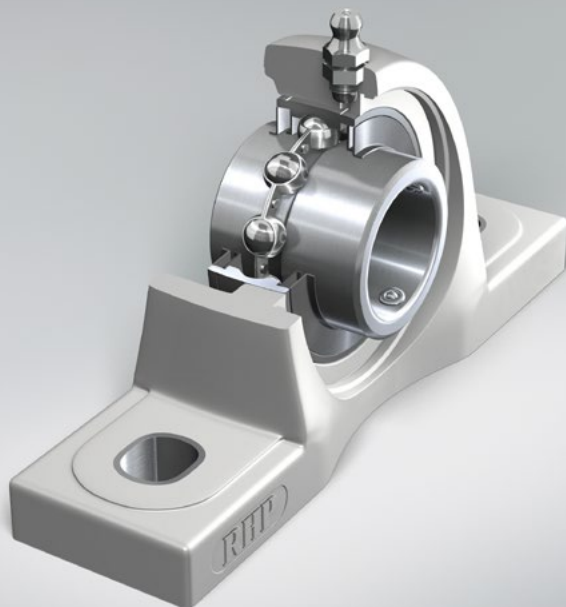
Silver-Lube® features durable and heat-resistant silicon rubber seals that protect against fluid penetration and prevent washout of the lubricating grease. Complementing the seal is a

stainless steel flinger, which prevents the ingress of bacteria and helps the seal to resist impact damage. Silver-Lube® bearings also comprise numerous corrosion-resistant components, including inserts with high-grade stainless steel rings and balls, cage, flingers, and set screws. Furthermore, the bearing insert sits within a high-strength PBT thermoplastic housing featuring a stainless steel grease nipple.

After the initial trial, the plant implemented Silver-Lube® housed bearing units on all five of its milk bottle conveyor systems. The result: a reduction in machine downtime, maintenance labour and replacement bearings costs, leading to annual savings of €7,625. Indeed, no failures of Silver-Lube bearings occurred for more than five years.

Importantly, Silver-Lube® bearings units can accommodate initial misalignment from mounting errors, making them ideal for bottling machines and conveyors used by the food and beverage industry. Additional attributes include: a paint-free resin housing to eliminate any risk of chipping or flaking; a cavity-free design to avoid 'bug traps' that might harbour bacteria or mould; a smooth finish to prevent dirt adhesion; and suitability for working temperatures from -20 to +90°C.

RHP bearings



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Panduit introduces the compact semi-automatic, "PLA-100/E" WrapID automatic labelling system offering significant increases in productivity for medium to high-volume label applications.

Users can benefit from faster turnaround times of up to 3X faster than traditional manual installation and 2X faster than leading competing systems. The winding head of the compact system is easy to reach, so that labels can be attached to the line or cable within 12.7 mm of the connectors or terminals. In addition, the label head has a modular design and can be replaced easily and inexpensively during maintenance, and the label position can be realigned at the push of a button.

Improved ergonomics reduce operator fatigue and minimize the risk of repetitive motion injuries. Panduit's analysis between manual and automated systems shows that the WrapID automated labeling system saves approximately 170 labor hours per 100,000 labels. Compared to competitor automated systems, Panduit's solution saves approximately 80 man-hours per 100,000 labels against competitor's systems.

www.panduit.com

DSEAR 3 DAY - Risk Assessment Training Course (14th - 16th June)

Our "Three Day" DSEAR course is aimed at those who responsible for conducting DSEAR assessments, but are not necessarily fully confident with the process. They may work in a flammable environment, in-addition to being responsible for managing the area, day to day.

The course content:

- Legal foundations
- How sources of danger arise.
- What is the difference between flashpoint, fire point, boiling point and Auto Ignition?
- The fundamentals on the origin of Explosions, Deflagrations and Fires
- Risks resulting from improper storage or

handling of these substances

- The meaning of the danger triangle and pentagon.

An overview of the regulations, understanding solvents and their physical properties, explosive dusts, ATEX classifications, gas groups, temperature ratings and BS 60079-10 Ex Zone determination, all giving a greater understanding of how ATEX fits into the DSEAR equation when establishing hazardous zones.

Reference is made to the theoretical understanding of flammable vapours with examples of how the L.E.L can be converted into a meaningful quantity of chemical per cubic metre.

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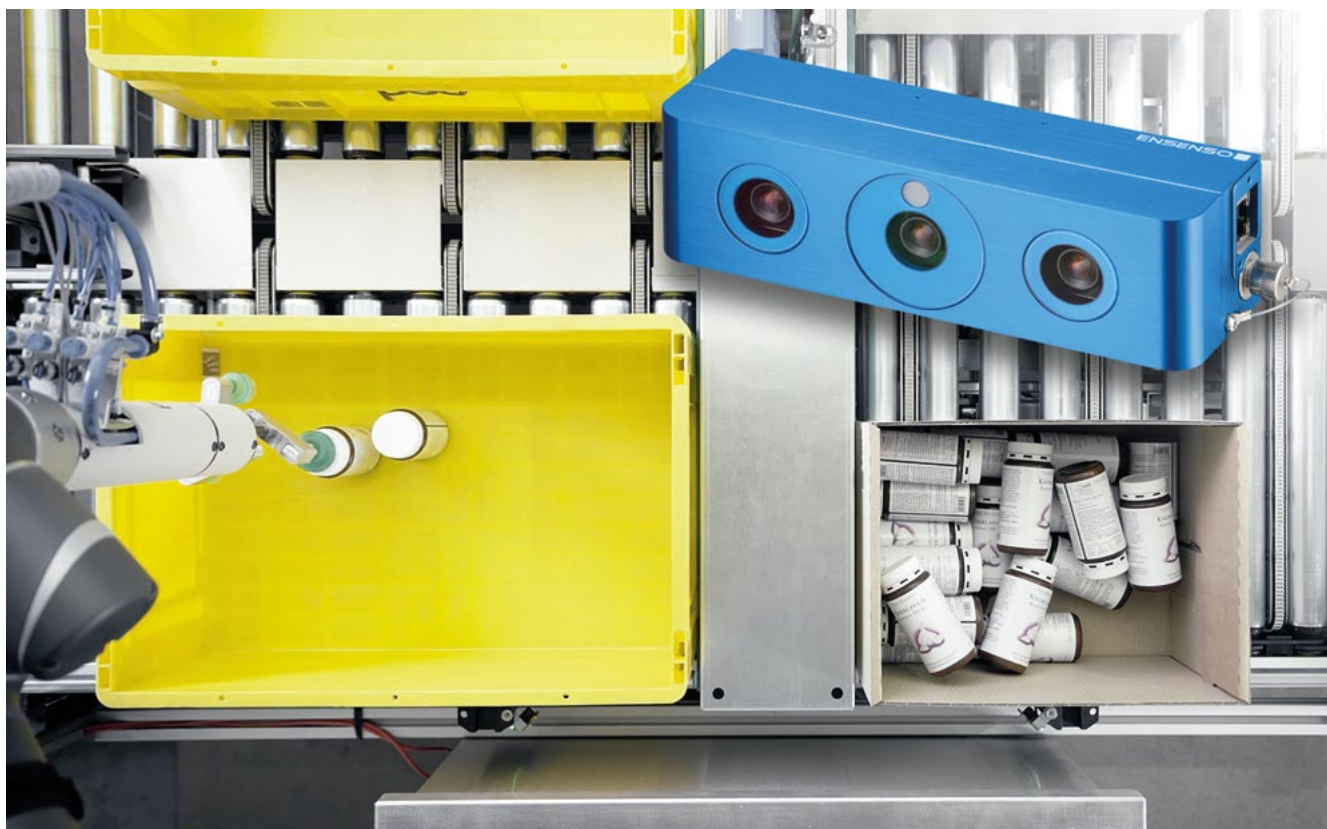
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Robots on their own

Fully automatic picking of unknown products from bulk material

In intralogistics, there has been a real hype about robotics for some years now, whether in trade journals or at fairs. Most of them are classic six-axis articulated robots that are looking for their way out of a production environment and into logistics. The goal: fully automated small parts picking. The main driver here is the labour shortage, the big challenge not a technical component like the robot or the gripper, but the design of an overall economic process. Since robots can only handle a portion of the items in each assortment, there are parallel streams of goods and thus possible risks with regard to the flow of goods, inventories, synchronisation and consolidation.

The "autopick" picking robot from psb intralogistics GmbH in Pirmasens (Germany) meets this challenge. At its core, the fully automated solution for picking individual items consists of a robot with gripper, the IT network for the entire system and a powerful image processing system - equipped with two Ensenso 3D cameras from IDS Imaging Development Systems GmbH.

APPLICATION

The vision system acts as the eye of



Multifunctional vacuum cups ensure gentle gripping of a wide variety of items

the robot. It detects grippable surfaces on the objects to be processed in the source container and calculates grasping points and collision-free paths for the robot. This enables the robot to pick up unknown products directly from bulk material and place them in the target bin in the area with the lowest filling.

Vacuum cups ensure gentle gripping of the respective objects. A previous "teach-in" of the individual products is not necessary. Regardless of whether it's a medicine bottle or a tea pack, the multifunctional gripper can be individually designed for a wide variety of articles with the most diverse packaging units. The system learns over time which of the different graps works best for each item. The achievable picking performance for a process-safe system is highly dependent on the characteristics of the gripping objects and ranges between 300 and 500 parts per hour.

Two Ensenso N35 3D cameras provide the system with the necessary image data. All Ensenso 3D cameras work according to the "Projected Texture Stereo Vision" method. Each model uses two CMOS sensors and a projector that projects high-contrast structures onto the object to be captured - even in difficult lighting conditions. Ensenso cameras operate using stereo vision, which imitates the human vision. The result is a 3D point cloud as the basis for the required spatial object information.

To integrate the cameras into autopick, psb intralogistics used the Ensenso SDK. In addition to wizards for easy setup and

to support camera calibration of the 3D cameras, it includes the option for GPU-based image processing for even faster 3D data processing.

It also enables the output of a single 3D point cloud of all cameras used in multi-camera operation, which is required in this case, as well as the live composition of the 3D point clouds from multiple viewing directions.

The first camera is installed above the source box in order to consider the latter as a collision object in the path planning of the robot arm. Here the unknown parts are presented and the point cloud for searching the appropriate handle point is generated. The latter is done with the help of the Mikado ARC (Adaptive Robot Control) software from isys vision. It combines Ensenso's 3D stereo vision camera technology with an easily configurable, adaptive robot controller. The result is a complete 3D robot vision solution for bin picking and parts handling with an autonomously operating robot, as supplied by autopick. Instead of following predefined, taught and firmly defined paths, it orients itself independently in the workspace and reacts to every situation.

The second camera is above the target box. It searches for free storage positions. In addition, the Z-height of the box content is determined in order to be able to take this into account when determining the storage position. It is crucial that



the target box is occupied evenly and that the products are placed carefully. The latter is particularly important when picking fragile parts. The image acquisition is asynchronous to the movement of the robot in order to optimise the cycle time.

"We chose the Ensenso N35 for its compact design and high point cloud quality. For the considered field of view, the N series is ideal. The configuration of the camera can be easily and precisely adjusted to the respective product portfolio, or even adapted during the process," explains the system manager at psb intralogistics. Handle information and picking orders are exchanged via the interface to the warehouse management system.

OUTLOOK

Online trade continues to have strong growth ahead of it. At the same time,

the e-commerce sector is becoming increasingly tough. Innovative intralogistics technologies are therefore often necessary to remain competitive. At the same time, hardly any economic sector is currently struggling as much with the lack of suitable young talent as logistics. The economic benefit of picking robots is therefore so substantial that they will have a permanent place in commissioning in the medium to long term. The underlying solutions with artificial intelligence will learn to master other challenges besides gripping - independently or also collaboratively in cooperation with humans, reliably and precisely. Image processing with 3D cameras, among others, provides the decisive overview and the necessary safety.

<https://en.ids-imaging.com>



The robot picks up unknown products from bulk material and places them in the target container - 300-500 parts/h depending on the gripping object



Combine PAT with automation to unleash the potential of smart factories

When backed by Process Analytical Technology (PAT), Smart Factories can maximise responsiveness on the factory floor by leveraging data generated throughout the entire manufacturing process. This leads to substantial improvements in product quality, throughput and efficiency, providing companies with a massive competitive advantage.

Martin Gadsby, Director of the Optimal Group, looks at how PAT-driven automation can help businesses realise the benefits of smart manufacturing.

The digital transformation of business is enabling the creation of data-led manufacturing strategies combined with fully automated operations. To this end, factory floors are being converted into intelligent networks of interconnected sensors, machines, processes and systems. With the potential to adjust and optimise processes in real time, Smart Factories need effective data gathering and mining solutions.

A PAT framework is essential to transforming the collected data into actionable insights and realising responsive smart manufacturing applications. This quality-driven approach relies on the relationship between critical process parameters and critical

quality attributes of raw and in-process materials to optimise manufacturing activities.

THE IMPORTANCE OF A PAT KNOWLEDGE MANAGER

While it is relatively easy to generate large volumes of production data, businesses need a PAT knowledge management platform, such as synTQ, to identify which data sets should be stored, assessed and rationalised into actionable knowledge. Used by over 60% of global pharmaceutical majors, this framework can help to create flexible, futureproof plants that can quickly adjust process parameters to enhance operational efficiency and product quality.

An intelligent PAT management system also ensures that plant operators have instant access to actionable knowledge by automatically sorting and filtering manufacturing data. In addition to this, historical data can be profiled to develop process-related mechanistic knowledge that can achieve further production improvements.

Finally, an advanced PAT data management platform that supports data fusion, sharing and advanced analytics can enable the creation of highly automated Industrial Internet of Things (IIoT) applications. These, in turn, offer

improvements in throughput and deliver consistent quality.

SET UP A RELIABLE PARTNERSHIP

To create effective Smart Factories and reap the benefits of real-time process control and monitoring, manufacturers should partner with an experienced automation specialist. The Optimal Group – Optimal Industrial Automation together with Optimal Industrial Technologies – has been delivering automation and PAT-driven automation systems to enhance the competitiveness of businesses for over 30 years. In particular, the company specialises in integrating the PAT knowledge management system, synTQ, within its advanced automated solutions.

By collaborating with an integrator that can deliver PAT-driven automation systems, manufacturers can minimise production costs, material and energy usage, increase throughput and improve product quality.

Image captions: PAT-driven automation can help businesses succeed in smart manufacturing strategies by delivering data-driven actionable insight into production processes.

www.optimal-ltd.co.uk

Optimum oil-free vacuum technology

Clean processes, efficiency and sustainability are important criteria for vacuum technology to meet in the 21st century.

To meet these demands, Vacuubrand have created a range of powerful and pure vacuum technology solutions.

For fine vacuum applications, the VACUU-PURE 10C screw pump offers an oil-free and chemically resistant solution that saves time and minimises operating costs. Specifically designed for processes in the vacuum range down to 10⁻³ mbar, it can be used across the entire pressure range. Aggressive gases and vapours can be pumped without worry due to the unit's high chemical resistance, and the use of a cold trap is no longer necessary for most applications.

For rough vacuum, VARIO Select units offer a selection of vacuum ranges and pumping speeds, while the integrated and intuitive VACUU-SELECT controller allows for easy control of vacuum



and process steps. Additional features include an inlet separator, which retains particles and droplets, and an exhaust emissions condenser, which enables solvent recovery of nearly 100%.

Contact Labtex on 01484 600200 to discover more about Vacuubrand vacuum technology solutions.

www.labtex.co.uk

High performance fluoroplastic products from Labtex

Labtex offer a vast range of finished and semi-finished products in technical and fluoroplastics.

A variety of materials, such as PTFE, FEP, PFA, PEEK, enable the development of innovative products for stirring and mixing, temperature measurement, distillation and filtration, with excellent chemical resistance and thermal resistance.

Screw joints and ground joint components, tubing and connectors allow an infinite number of combinations to create sophisticated systems of sampling and feed using standard laboratory bottles and containers.

For distillation of strong acids or alkaline products, BOLA manufactures reaction vessels up to 6 litre capacity in PTFE or PFA. All parts exposed to the medium are made completely of PTFE or PFA.



The BOLA catalogue also includes a wealth of technical information on the materials used including physical properties and chemical resistance and the safe use and care of fluoroplastic labware

For more information about fluoroplastic products, call Labtex on 01484 600200.

www.labtex.co.uk

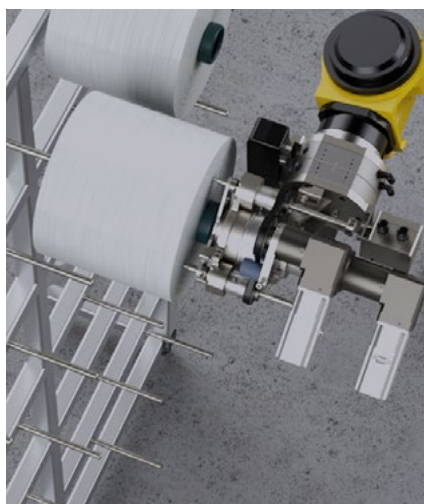


Picked up and put off

Autonomously driving robotic assistance system for the automated placement of coil creels

Due to the industry standard 4.0, digitalisation, automation and networking of systems and facilities are becoming the predominant topics in production and thus also in logistics. Industry 4.0 pursues the increasing optimisation of processes and workflows in favour of productivity and flexibility and thus the saving of time and costs. Robotic systems have become the driving force for automating processes. Through the Internet of Things (IoT), robots are becoming increasingly sensitive, autonomous, mobile and easier to operate. More and more they are becoming an everyday helper in factories and warehouses. Intelligent imaging techniques are playing an increasingly important role in this.

To meet the growing demands in scaling and changing production environments towards fully automated and intelligently networked production, the company ONTEC Automation GmbH from Naila in Bavaria has developed an autonomously driving robotic assistance system. The "Smart Robot Assistant" uses the synergies of mobility and automation: it consists of a powerful and efficient intralogistics platform, a flexible robot arm and a robust 3D stereo camera system from the Ensenso N series by IDS Imaging Development Systems GmbH.



The solution is versatile and takes over monotonous, weighty set-up and placement tasks, for example. The autonomous transport system is suitable for floor-level lifting of Euro pallets up to container or industrial format as well as mesh pallets in various sizes with a maximum load of up to 1,200 kilograms. For a customer in the textile industry, the AGV (Automated Guided Vehicle) is used for the automated loading of coil creels. For this purpose, it picks up pallets with yarn spools, transports them to the designated creel and loads it for further processing. Using a specially developed gripper system, up to 1000

yarn packages per 8-hour shift are picked up and pushed onto a mandrel of the creel. The sizing scheme and the position of the coils are captured by an Ensenso 3D camera (N45 series) installed on the gripper arm.

APPLICATION

Pallets loaded with industrial yarn spools are picked up from the floor of a predefined storage place and transported to the creel location. There, the gripper positions itself vertically above the pallet. An image trigger is sent to the Ensenso 3D camera from the N45 series, triggered by the in-house software ONTEC SPSCComm.

It networks with the vehicle's PLC and can thus read out and pass on data. In the application, SPSCComm controls the communication between the software parts of the vehicle, gripper and camera. This way, the camera knows when the vehicle and the grabber are in position to take a picture. This takes an image and passes on a point cloud to a software solution from ONTEC based on the standard HALCON software, which reports the coordinates of the coils on the pallet to the robot.

The robot can then accurately pick up the coils and process them further. As soon as the gripper has cleared a layer of the yarn spools, the Ensenso

camera takes a picture of the packaging material lying between the yarn spools and provides point clouds of this as well. These point clouds are processed similarly to provide the robot with the information with which a needle gripper removes the intermediate layers. "This approach means that the number of layers and finishing patterns of the pallets do not have to be defined in advance and even incomplete pallets can be processed without any problems," explains Tim Böckel, software developer at ONTEC. "The gripper does not have to be converted for the use of the needle gripper. For this application, it has a normal gripping component for the coils and a needle gripping component for the intermediate layers."

For this task, the mobile use for 3D acquisition of moving and static objects on the robot arm, the Ensenso 3D camera is suitable due to its compact design. The Ensenso N 45's 3D stereo electronics are completely decoupled from the housing, allowing the use of a lightweight plastic composite as the housing material. The low weight facilitates the use on robot arms such as the Smart Robotic Assistant. The camera can also cope with demanding environmental conditions. "Challenges with this application can be found primarily in the different lighting conditions that are evident in different rooms of the hall and at different times of the day," Tim Böckel describes the situation. Even in difficult lighting conditions, the integrated projector projects a high-contrast texture onto the object to be imaged by means of a pattern mask with a random dot pattern, thus supplementing the structures on featureless homogenous surfaces. This means that the integrated camera meets the requirements exactly.

"By pre-configuring within NxView, the task was solved well." This sample programme with source code demonstrates the main functions of the NxLib library, which can be used to open one or more stereo and colour cameras whose image and depth data are visualised. Parameters such as exposure time, binning, AOI and depth measuring range can - as in this case - be adjusted live for the matching method used.

The matching process empowers the Ensenso 3D camera to recognise a very high number of pixels, including their position change, by means of the auxiliary structures projected onto the surface and to create complete, homogeneous depth information of the scene from this. This in turn ensures the necessary precision with which the Smart Robot Assistant proceeds. Other selection criteria for the camera were, among others, the standard vision



interface Gigabit Ethernet and the global shutter 1.3 MP sensor. "The camera only takes one image pair of the entire pallet in favour of a faster throughput time, but it has to provide the coordinates from a relatively large distance with an accuracy in the millimetre range to enable the robot arm to grip precisely," explains Matthias Hofmann, IT specialist for application development at ONTEC. "We therefore need the high resolution of the camera to be able to safely record the edges of the coils with the 3D camera." The localisation of the edges is important in order to be able to pass on as accurate as possible the position from the centre of the spool to the gripper.

Furthermore, the camera is specially designed for use in harsh environmental conditions. It has a screwable GPIO connector for trigger and flash and is IP65/67 protected against dirt, dust, splash water or cleaning agents.

SOFTWARE

The Ensenso SDK enables hand-eye calibration of the camera to the robot arm, allowing easy translation or displacement of coordinates using the robot pose. In addition, by using the internal camera settings, a "FileCam" of the current situation is recorded at each pass, i.e. at each image trigger. This makes it possible to easily adjust any edge cases later on, in this application for example unexpected lighting conditions, obstacles in the image or also an unexpected positioning of the coils in the image. The Ensenso SDK also allows the internal camera LOG files to be stored and archived for possible evaluation.

ONTEC also uses these "FileCams" to automatically check test cases and thus ensure the correct functioning of all arrangements when making adjustments to the vision software. In addition, various vehicles can be coordinated and logistical bottlenecks minimised on the basis of the control system specially developed by ONTEC. Different assistants can be navigated and act simultaneously in a very confined

space. By using the industrial interface tool ONTEC SPSComm, even standard industrial robots can be safely integrated into the overall application and data can be exchanged between the different systems.

OUTLOOK

Further development of the system is planned, among other things, in terms of navigation of the autonomous vehicle. "With regard to vehicle navigation for our AGV, the use of IDS cameras is very interesting. We are currently evaluating the use of the new Ensenso S series to enable the vehicle to react even more flexibly to obstacles, for example, classify them and possibly even drive around them," says Tim Böckel, software developer at ONTEC, outlining the next development step.

ONTEC's own interface configuration already enables the system to be integrated into a wide variety of Industry 4.0 applications, while the modular structure of the autonomously moving robot solution leaves room for adaptation to a wide variety of tasks. In this way, it not only serves to increase efficiency and flexibility in production and logistics, but in many places also literally contributes to relieving the workload of employees.

CLIENT

ONTEC Automation GmbH is a system provider for integrated and innovative automation systems, plants and special machines for industrial production. The business units consist of Technical Textile Solutions, Automation Solutions, Smart Robotic Solutions and Electric Switchboard Solutions. The company's expertise with 25 years of experience is reflected in innovative, customer-oriented solutions along the entire value chain and includes robotics, industrial image processing, software development, electrical engineering and mechanics.

Shrink energy costs by using Linear Motors instead of Pneumatics

Powering actuators directly with Linear electric motors rather than air cylinders can result in huge cost and emission savings across the board.

The recent dramatic increase in energy cost is a big concern for industry, which makes switching to electrical actuators even more attractive. Compressed air is very wasteful of energy and can be eliminated in machines by using linear motors in place of air cylinders.

Quin Systems, exclusive UK suppliers of LinMot Linear Motors for over 25 years, can help you calculate the predicted carbon and energy savings achieved by switching from a pneumatic solution to a linear motion solution.

LinMot, one of the world's leading manufacturers of industrial linear motors has released a new component of its LinMot Designer software that can quantify just how energy efficient its solution is, and the sizeable return on investment their motors can provide over pneumatics.

Efficiency and CO2 results from Linmot Designer® for the worked example:

Efficiency and CO2 Emission

Total moving Distance per Cycle 4 m
Total cycle Time: 6 secs

Moving mass: 5kg
Friction Force: 100N

Motion Continuous: 8000h/year

Linear motor (Linmot)

Electric Motor Power(1) [W]	Electric Power(2) [W]	Electricity Consumption per Year(3) [kWh]	CO2 Emission per Year(4) [kg]	Electricity Costs per Year(5) [EUR]
95	143	1'145	573	137

Pneumatic Cylinder

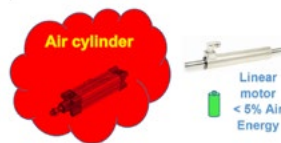
Air Piston Diameter [mm]	Air Consumption per Year(1) [Nm3]	Electric Power [W]	Electricity Consumption per Year(2) [kWh]	CO2 Emission per Year(3) [kg]	Electricity Costs per Year(4) [EUR]
63	461'293	6'815	54'516	27'258	10'484

EXAMPLE

Take an example within the handling and assembling sector. Linear actuation is required on the horizontal plane to move items through to the next stage of the production process.

A single LinMot Linear motor with guide can replace a traditional 63mm diameter rodless air cylinder for this task, ultimately reducing annual energy cost by over 10,000 EUR and CO2 emissions by over 26,000 kg.

The return on investment is significant. Energy saved by using a single electrically driven actuator over a basic traditional pneumatic cylinder has the potential



to cover its higher initial outlay within a very short timeframe, typically less than a year.

Combined with the extraordinarily long operation life of LinMot

Linear Motors and the next to zero servicing requirements mean LinMot's solution will continue working for years.

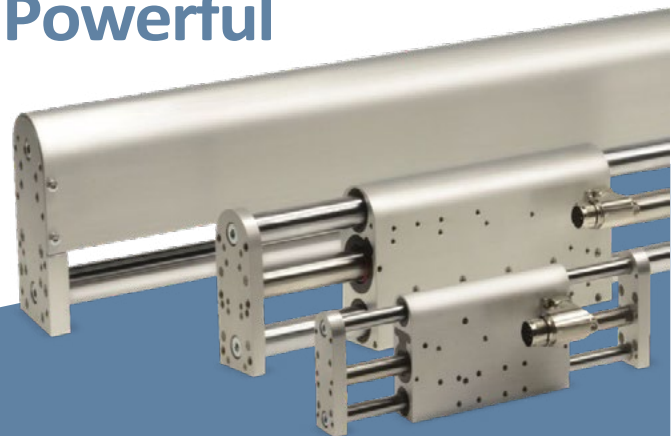
This improves the cost benefits and environmental efficiency of your production line by a significant margin. For more information, please contact Quin Systems, the LinMot distributor for UK & Ireland on 0118 977 1077 or sales@quin.co.uk.

Website: www.quin.co.uk/linmot

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Thorite celebrates incorporation centenary with webstore launch

Thorite, the UK's leading independent air and fluid power product, systems and services provider, has celebrated the centenary of its incorporation with the launch of a new webstore.

The webstore features a click-and-collect service for more than 30,000 products, including more than 100 brands of pneumatic, compressed air, vacuum and fluid handling components. In-stock items can be collected within two hours of purchase.

Thorite's Managing Director, Stephen Wright, said the company's strong customer service and aftermarket support was central to its successful trading history.

He added: "We worked tirelessly throughout the



pandemic to ensure our customers received the products and support they required.

"That experience gave us valuable insight into the ways customers interact with the company and inspired us to develop a webstore which is easier, faster and more intuitive.

"We're delighted to reach this milestone 100 years of incorporation confident that our customers are benefitting from a service that is constantly improving."

www.thorite.co.uk

Robotic Process Automation (RPA) continues expanding from IT to non-IT Stakeholders

By Anwen Robinson, Infor GM and SVP for UK & Ireland

In 2022, robotic process automation (RPA) is poised for a breakthrough into the mainstream consciousness. RPA refers to the automation of business processes via software platforms that script and operate pre-defined tasks across a variety of applications. Many repetitive business application tasks can be automated in this manner and RPA can be combined with Artificial Intelligence (AI) to create more advanced automations, with the AI providing the requisite context and self-correction to the automated process.

The RPA software industry has been experiencing explosive growth, with the reasons for this growth well-known in IT circles. RPA can significantly boost employee productivity, freeing workers from time-consuming and repetitive operations, and we are now seeing the awareness and utilisation of RPA expand into traditionally non-IT domains, promoting exponential growth of RPA across the organisation.

NON-IT APPLICATIONS OF RPA

Examples of RPA applications are appearing right across the enterprise. This includes smart bots that speed up the processing of external vendors' invoice approvals; RPA workflows that incorporate AI to automate monthly data collection and metric calculations, and RPA bots automating back-office operations involving compliance, orders processing and customer requests.

As automated workflows become more common in business applications, RPA functionality will increasingly be built into commercial software. Recent trends such as Industry 4.0 demonstrate the utility of these tools.



RPA AS AN ACCELERATOR OF INDUSTRY 4.0

Industry 4.0 focuses on the synchronisation of Information Technology (IT) and Operational Technology (OT), forming a cyber-physical continuum, or computer system monitored by computer-based algorithms, incorporating IoT-enabled intelligent devices. As RPA becomes more integrated with Artificial Intelligence (AI) and Machine Learning, the adaption of RPA tools utilising AI will accelerate the effectiveness of Industry 4.0 across the entire value chain.

For example, shop-floor processes are still often driven by paper-based tracking. Custom-defined workflows enable users to automate and streamline tracking as new functionality is needed, with the results used for advanced dashboards and reporting. As Industry 4.0 adoption gains traction, we will see increased RPA adoption in manufacturing operations.

RPA AS AN ENABLER OF BUSINESS RESILIENCE

COVID-19 has caused a series of disruptions, significantly in global supply chain and human resources. In response, firms are increasingly turning to RPA projects to deal with these disruptions and increase resilience in their business process operations. Such large-scale adoption implies growing recognition of the value of RPA among non-IT stakeholders.

As we have seen in other areas of digital transformation, widespread adoption of RPA across the enterprise will drive yet another technology-driven shift in the modern workforce. Thomas Friedman, the New York Times bestselling author, and three-time Pulitzer Prize winner, assures us not to be alarmed. "The robots are not destined to take all the jobs", he writes in his 2016 book, *Thank You for Being Late*. He predicts a future workforce freed from repetitive and mind-numbing tasks, allowing employees to maximise their creativity.

As RPA becomes the norm for firms across the globe, there will be a growing awareness of its potential among non-IT stakeholders. RPA's resilience and scalability were demonstrated during the onset of COVID-19 disruptions and Industry 4.0 will keep RPA and associated AI functionality at the forefront of organisational change well into the future.

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About Active8 Robots

Active8 Robots specialises in the smarter application of robotics technologies, industrial automation and system integration solutions.

A repetitive dexterous task, such as grabbing, lifting, picking or positioning is considered simple and easy for an able-bodied human but is often too complicated and involved for a robot to achieve by itself. Active8 Robots has considerable expertise in designing and developing solutions to overcome such challenges. With an industry-renowned rapid prototyping capability that can

go from paper to prototype in 24 hours, Active8 Robots has provided countless iterations for bespoke end-of-arm tooling and adaptations to existing industrial robots and cobots.

Having worked with CREAT3D, independent Additive Manufacturing solutions provider, over the past five years, Active8 Robots have developed a dedicated innovation centre, whereby Additive Manufacturing has become an integral part of Active8's portfolio. A particular focus has been delivering bespoke 3D printed end-use components for highly intricate tasks.

These 3D printed parts have enhanced functionality, are more lightweight, have lower costs and are designed, developed, tested and produced faster than traditionally manufactured parts.

THE APPLICATIONS

Clients approach Active8 Robots with a wide variety of needs and objectives for adopting new or adapting existing robotic technologies.

The solution will often be uniquely tailored to carry out a particular task, so Active8 needs tools that can deliver





on these aspects. Producing more lightweight end effectors increases the productivity of the robot, which in turn increases efficiency and reduces costs, while ensuring the parts are capable of withstanding harsh environments.

Active8 Robots has a dedicated Additive Manufacturing innovation centre, with over 12 3D printers in total, including a range of FFF, SLA, and three CFF Markforged Industrial and Desktop Composite 3D printers, provided and supported by CREAT3D (fully certified provider for all Markforged's composite desktop, industrial and metal 3D printers).

"Our 3D printers are indispensable to us. They form a fundamental part of our process," explains Alan Quinn, Engineering Manager from Active8 Robots.

The SLA and FFF machines are used for early-stage prototype and design development, whilst the Markforged 3D printers are also used to produce tooling and end-use components to customers – from conveyor guides to sensor mounts and tooling.

THE RESULTS

Alan Quinn: "We can prototype quicker, design better, produce a more refined end product and we can achieve continuous improvement."

Faster Turnaround

Additive presents a phenomenal time saving, reducing lead times to a matter of hours versus 3-4 weeks for external CNC machining. Using 3D printers in-house means that Active8 Robots can provide its clients with a superfast turnaround on idea and product development. Designs, from initial concept, to end components, are done in-house,

overnight. Testing is carried out faster, and any design changes that need to be made are adopted immediately, re-printed and retested, reducing risk. There is no need for additional purchase orders, supplier selection or supplier management.

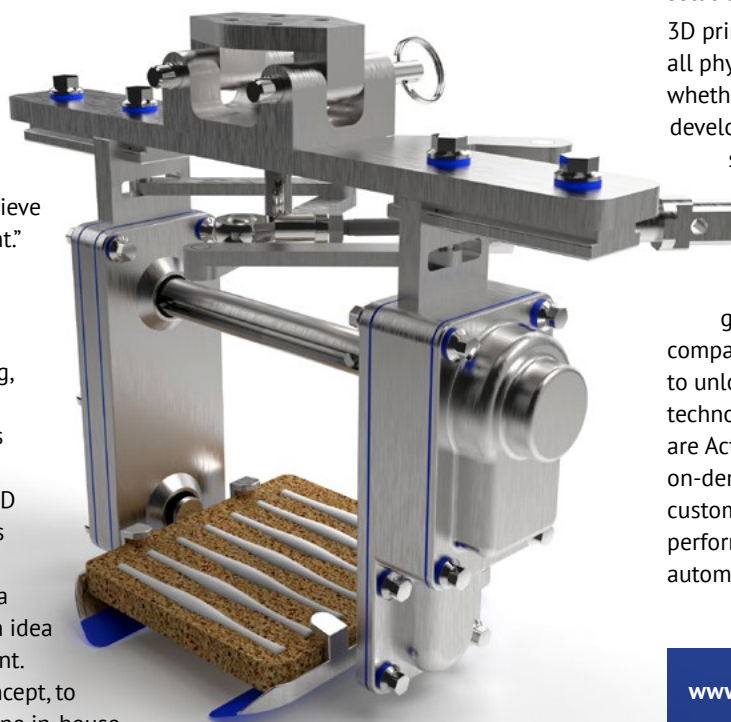
Custom solution – manipulating sandwiches

The development of a bread lifting tool was achieved through the use of Markforged Composite 3D printers - producing accurate prototypes for fit and test assessments, before producing the final product in stainless steel. Using Additive resulted in:

- Reduction of 88.6% in lead time. From outsourced supply of 4-6 weeks to internal 3D print time of < 24 hours

Lightweight = enhanced part performance

Often the geometry of end of arm tooling can be difficult to machine. With 3D printing, the design can be adapted to better fit the task, and it is made lighter.



Using Onyx (nylon with micro carbon fibres), Active8 Robots are able to print end-of-arm tooling that is hollow, yet strong.

3D printing end effectors also enables the storing of a digital file only, enabling manufacturing on demand, avoiding stockholding, reducing warehousing space and storage costs.

End-of-arm tooling – foam gripper

Active8 Robots' Foam Gripper is a highly versatile tool, able to pick up multiple objects up to a weight of 10kg, thanks to a vacuum generator and solenoid built inside.

The main body of this gripper is a 3D printed one-piece hollowed part, something hard to achieve through traditional fabrication methods. Alan Quinn:

"Cobots have limitations on pay loads, generally somewhere between 2 - 6kg. The benefit of 3D printed end-of-arm tooling is that those 3D printed components are extremely lightweight, which means the productivity of a robot can be substantially increased."

Benefits of 3D printing:

- Reduction of weight by 50%
- Reduction of development time from 1 week to 3 days
- Reduction of costs from £70 to £10 in materials

3D printing as a trusted tool in every solution

3D printing is used in some context on all physical projects by Active8 Robots, whether in early concept stages, design development, product testing, end solutions or end-use component and continuous development.

Simon Chandler, Managing Director of CREAT3D: "It's great to support manufacturing companies in adopting Additive in order to unlock the large gains which this technology makes possible. Not only are Active8 benefitting from flexible on-demand production, but also their customers are receiving market leading performance from their advanced automation and robotic solutions."



Q&A with Oliver Selby, Robotics Business Development Manager, FANUC UK

WHY UK FIRMS MUST AUTOMATE TO COMPETE ON THE INTERNATIONAL STAGE

It's no secret that despite its position as a top 10 manufacturing economy, the UK lags well behind its global counterparts when it comes to our use of industrial robots. According to the 2021 IRF World Robot Report, the UK ranks just 24th in the world robot density league with 101 units per 10,000 employees, far outpaced by countries such as China, Japan, Korea, the US, Germany, Italy and France. Globally, however, it is a promising picture – the average figure of 126 robots per 10,000 employees is nearly double what it was in 2015. This makes the UK's continued reluctance to automate all the more surprising. Here, Oliver Selby, Robotics Business Development Manager at industrial robot specialist FANUC UK, shares his thoughts on what could be holding the UK back, how companies like FANUC are helping to drive a change in mindset, and the surprising positives to come out of the pandemic...



WHY DO YOU BELIEVE SOME UK MANUFACTURERS ARE STILL RELUCTANT TO AUTOMATE?

There's a long-standing misconception that automated solutions including robots take the place of production workers. In actual fact, this is not the case but we need more robotics users to come forward and say so. Most plants find that investment in robotics actually leads to productivity gains, company growth and, subsequently, the need to employ more people.

Labour shortages post-Brexit and the much-debated 'Great Resignation' following the pandemic have prompted some recent investment activity in certain industries, such as food, but this has been the exception rather than the rule – it's always 'next year' with UK companies. Manufacturing and process plants here tend to dip their toe in the water regarding investment in automation, unlike their counterparts in mainland Europe who are more inclined to throw themselves in. That being said, things are steadily beginning to change, with more companies across all industries now waking up to the benefits of automation. Enquiry levels are holding steady in the UK and we predict that sales of FANUC robots will be reasonable this year.

WHAT PART DOES EDUCATION HAVE TO PLAY IN CHANGING THE UK MINDSET AROUND AUTOMATION?

I believe that educating young people on the benefits of robotics and automation can hugely help to alter our national perception that robots are the 'enemy'.



Robot arms can now be found in schools, colleges, universities and training centres up and down the country. At FANUC we've had cost-effective educational cell packages available for the past seven years, with increasing uptake, thanks in part to our role as a sponsor partner of WorldSkills, a global vocational skills championship that helps prepare young people for a career in robotics. We sell around 25 educational cells into the UK every year, with the latest package featuring a FANUC CRX-10iA collaborative robot.

DO YOU BELIEVE THAT UK MANUFACTURERS ARE FULLY AWARE OF THE BENEFITS OF DIGITALISATION?

In general, UK companies have trouble relating to the added value that

connected or smart technology brings. However, we are talking to some UK plants about adopting higher levels of digitalisation via our open-platform FIELD system, which stands for FANUC Intelligent Edge Link and Drive. The FIELD system can connect robots and machine tools of different generations from all manufacturers and with FIELD system apps, companies can monitor, measure and analyse data to improve production efficiencies.

DO YOU FEEL WE ARE ON THE CUSP OF AN ELECTRIC VEHICLE REVOLUTION HERE IN THE UK?

The automotive industry's transition to electric vehicles is high on our agenda. Hopefully, we are seen as the market leader for both battery and EV manufacture, particularly as FANUC is

at the heart of all Tesla's automated production in the US and Germany. The UK is planning to build a number of gigafactories for battery manufacture, but if these gigafactories are looking at space and buildings, they should also be looking at the associated automation infrastructure – particularly given the current global supply chain issues. If people commit, we will work with them commercially to ensure we manage any risks effectively.

ARE YOU OPTIMISTIC ABOUT THE FUTURE FOR UK AUTOMATION?

Despite its challenges, one of the positives to come out of the pandemic was the fact that it accelerated digitalisation. Businesses that had already embraced automation were shielded from some of the immediate operational challenges caused by lockdowns and social distancing. This has prompted a shift in tone towards the benefits of automation rather than barriers to implementation.

Of course, there's still a lot of work to be done to bring us in line with our international peers, but I do feel as though the tide is beginning to turn. There is certainly a growing appetite for digital transformation among UK manufacturers, particularly in key growth markets such as food processing and packaging, making it an exciting time to be involved in the automation industry.

www.fanuc.eu/uk/en



Companies across all industries are now waking up to the benefits of automation



Prevention is better than the cure

Well-planned maintenance of any equipment is essential for long-term reliability and efficiency. Following the routine servicing carefully detailed in the operator's manual may seem obvious, but this is crucial to preventing potential downtime caused by avoidable issues. This is especially important for equipment, such as reciprocating compressors, that form a vital part of multi-million dollar marine gas transport vessels and need to operate reliably round-the-clock.

Anthony Cornes, Key Account Manager – Marine Service Solutions at Burckhardt Compression looks at the importance of following the correct maintenance procedures.

Like most large pieces of equipment, each compressor is specifically designed for a particular application. Using the most appropriate materials and components, which are tailored to the individual application, each build is unique. To reflect this, the installation and operation manuals will often have information that is exclusive to a particular machine.

EXPERT ADVICE

Reciprocating compressors are similar in principle to internal combustion engines and share concepts in lubrication, cooling and reciprocating pistons. The precision engineering of the design affords excellent reliability, which is supported by regular inspections and maintenance, as detailed by the OEM.

Each aspect of operation is carefully explained with cautionary notes about the consequences of poor maintenance to emphasize the importance of following procedures and using the right materials and components. For the lubrication systems, this is relatively obvious since all the moving parts rely on the correct specification of oil to perform reliably. The associated heaters and filtration systems need to be checked regularly to ensure a long service life.

The coolant system for a gas compressor is similar to that of a car or truck, in that it requires glycol to be added to the coolant water. This not only increases the boiling point of the coolant, but it also provides anti-corrosive properties

to protect the internal galleries of the compressor and the heat exchanger.

Glycol is used in marine applications, not because of the probable low ambient temperature, but due to the low suction temperature of the gas, which is related to the type of gas and its composition. In a land-based application, the compressor may be exposed to much lower temperatures and if it is stationary without antifreeze, the cylinder blocks could crack if the coolant froze as a consequence of incorrect maintenance.

MINI CASE STUDY: CHECK-LIST CAUTION

As part of the delivery of a new LNG vessel, all the equipment and systems are checked and commissioned prior to hand-over to the customer. This should involve a series of checklists and actions to ensure that everything is ready for the first day of full operation. The consequences of making assumptions or not following this system are highlighted in a recent example.

As part of a new build, Burckhardt Compression had delivered two boil-

off gas (BOG) compressors to an LNG transport vessel. The design was based on numerous criteria that had been established during the project planning phase. The coolant water specifications were part of this information package provided by the customer because they could affect the materials used in the construction of the compressor.

Furthermore, the overall compressor cooling system is separate from the compressors and beyond the scope of Burckhardt Compression. Following on from installation, any treatment of the cooling water, such as the addition of biocide, anti-freeze or anti-corrosion additives and maintaining proper mixture is a responsibility that is retained by either the shipyard or the vessel's owner.

PREDICTIVE MAINTENANCE

As with all equipment, manufacturers provide an owner's manual that offers all the information required to operate and maintain the machinery. In today's world where modern servicing routines are more proactive, manufacturers such as Burckhardt Compression encourage

predictive maintenance practices to optimize performance and minimize downtime. A flexible approach includes both regular maintenance schedules and predictive practices to ensure the continued reliable and efficient operation of the equipment.

After less than one year in service, the vessel reported coolant in the compressor oil system and requested



Burckhardt attend to investigate and provide technical support. When Burckhardt's engineers came on board to carry out this inspection, they found that the coolant galleries around the cylinders were more corroded than they expected. Further investigation showed that the correct, specified mixture of glycol had not been installed by the responsible maintenance team during the commissioning process and as a result, some corrosion was found in the cooling jacket of the cylinders as well as in the pipework to the compressor.

While this was not an immediate problem, left unchecked, the corrosion could cause serious damage. A plan was formulated where the compressors could continue to operate, having installed new coolant with the correct mixture of glycol, and the damaged parts would be replaced during the first dry-dock maintenance period.

ONGOING SUPPORT

Thankfully, the Burckhardt Compression service team discovered the issue and established the extent of the damage before it had an impact on the performance of the vessel. However, there is little consolation that this whole situation could have been avoided had the correct maintenance procedures been followed.

To resolve the situation, the cylinders and the pipework needed to be replaced. Aside from the time required to complete this work, the overall project cost was considerable. Burckhardt Compression has supported the operator with a comprehensive inspection report and planning for the new components that will be installed to ensure continued, reliable operation of the compressors.



For further information, please visit www.burckhardtcompression.com

Improved gas feeding in water treatment

Accurate gas dosing and the ability to control the feed to match changing conditions are vital for water treatment applications such as pH control using CO₂ or removing iron with oxidation. From the outset, the system requires accurate sizing and, combined with precise control enabled by automation, this will ensure product quality as well as a cost-effective process in the long term.

Greg Wainhouse, Industry Account Manager for Water Applications at Bürkert, explains how to ensure an accurate and cost-effective gas feed system.

Accuracy is a key requirement for feeding gas in a water treatment process. This ranges from applications that require neutralisation of pH levels with carbon dioxide, removing iron or manganese to create process water, or oxygenating wastewater to assist the bacterial breakdown process. Imprecise gas insertion can result in reduced process performance and a lower quality end-product. Moreover, excess gas use can significantly increase process costs over the long term.

Achieving an optimal gas feed requires accurate and responsive control, and this starts with accurate sizing of the metering and control system. The fundamental requirement for measurement of gases present in water is a precise calculation of inlet pressure, referred to as P1, outlet pressure, referred to as P2, as well as the flow rate. Together, these values are used to accurately size the system's mass flow meter (MFM) and control valves.

SIZING THE SYSTEM

Within a mass flow controller, the gas flows through a control valve orifice with a smaller diameter than the main pipe. This creates a pressure drop as the flow rate becomes proportional to the downstream outlet pressure, following Bernoulli's principle that states an increasing fluid speed creates a corresponding decrease in static pressure. This explains the importance of clarifying either the P1 (inlet pressure) or P2 (outlet pressure) to determine the potential flow rate.

Confirming the accuracy of these values is as important for optimising an existing system as it is for specifying a new application. It's not unusual for a customer site to use a mass flow meter or



controller that hasn't been correctly sized at the outset and is therefore inaccurate and unable to achieve the required flow rate. Usually, the site's engineers know the inlet feed pressure, though rarely the outlet figure, but a flow control specialist will be able to assist with accurate sizing and required flow rate calculation.

As well as pressure and flow rate, it's also vital to understand the precise gas volume to achieve the desired results for a given application. With this understood, a flow control partner can also support the calibration process to confirm accuracy of the sensors specific to the gases involved.

CONTROLLING THE GAS FEED

Assuming the ability to accurately measure gas flow, precisely controlling the feed is the next step. If gas pressure, flow rate and temperature are constant, fixed manual control of gas flow can be sufficient. However, this situation is a rare occurrence. Taking a CO₂ infusion application, for example, as the gas is fed in and volume of CO₂ in the host container decreases, inlet pressure also decreases, impacting flow rate accordingly. Opening the mass flow controllers orifice will increase flow rate, but maintaining accuracy across this control process requires automation to achieve the required precision.

Even more basic applications with a lower dependence on gas feed accuracy require human knowledge of mechanical valve control. However, this places greater reliance and time requirements for on-site operation by engineers, as opposed to time saving, automated control.

Managing flow also depends on the changing gas levels in the water.

Controlling pH, for example, can require precise adjustment based on feedback from a probe. Accurate and repeatable results rely on a rapid control response according to the changing conditions, which can only be achieved without impacting throughput by an automated process.

Automation also enables faster and more accurate documentation, removing the time requirement and potential for inaccuracies in reporting. Applications in food and beverage, for example, demand frequent data recording with evidence of accuracy from calibration records to meet national standards. While an automated system ensures a robust process, it also reduces costs in the long term, compared to human data logging.

AUTOMATED METERING AND CONTROL SOLUTION

While an experienced systems integrator might only require an accurate mass flow meter to achieve these benefits, OEMs and end-users can benefit from assistance in sizing, as well as a full package of flow system components including metering, larger control valves and sensors. Bürkert's engineers can provide a comprehensive system that is tailored to specific requirements and designed with all the components supplied in-house to ensure compatibility and optimum performance.

This service will not only achieve an accurate gas control system to meet the application's conditions, but it will also reduce the long term costs in raw materials, human resources and maintenance.

www.burkert.co.uk

Scaling up production, fast

The IHS Markit/CIPS Manufacturing Purchasing Managers' Index (PMI) value for May 2021 demonstrated that UK manufacturing is growing at its fastest rate in almost 30 years. Manufacturers must increase production to capitalise on the record growth in new orders. However, scaling up production quickly without additional floor space and workers can be challenging. Here Dave Walsha, sales manager at precision drive system supplier EMS, explores how expanding automation holds the answer.

In the PMI, any reading above 50 indicates growth. The value announced for May 2021 was 65.6 – the highest reading since the survey began in 1992. The easing of lockdown has unleashed pent-up demand, causing a steep increase in production volumes.

The plentiful market provides hope for manufacturers to bounce back after the pandemic by using the high demand to make up for lost profit. To make the most of this opportunity, manufacturers must quickly ensure their facilities are ready to accommodate the influx of new orders.

ACCELERATE AUTOMATION

Scaling up production requires investment in high quality equipment. The benefits of automation are widely known, and most manufacturers aim to incorporate it into production to some degree. However, many of these targets have so far only resulted in plans, pilots or small scale automation projects.

In fact, research conducted earlier this year by supply chain specialist Balloon One found that the UK lags behind ten other nations with similar levels of manufacturing, including Sweden, USA and Italy, for robot density. The investigation also found that the UK falls behind in productivity levels, which is arguably due to lower levels of automation.

Investing in automated equipment is an efficient way to increase production, as it doesn't require the company to hire a large number of extra workers. In addition, it's possible to increase manufacturing productivity in the same floor space.

SELECT RELIABLE COMPONENTS

In order for UK manufacturers to profit from growing demand, they must widely rollout automation across the supply chain. However, not all

automated machines are built equal, and the components engineered into their systems play a large role in their overall performance. Manufacturers must remember that automation is an investment, that must be thought through with care.

When scaling up production, it's important that manufacturers and design engineers don't look for quick fixes. The new machines implemented should be not only able to accommodate the recent rise in orders, but also continue to benefit production in the long run.

Therefore, it's important that automated machinery components, particularly their powering motors, are selected for reliability. An unreliable motor can ultimately lead to failure, but it's important to note that, before it even reaches that point, a motor can cause inefficiency. In fact, an inefficient motor can result in electricity running costs that account for 97 per cent of its lifetime costing.

Automated equipment should be designed with dependable motors, such as the DMN range of brushed motors, which are renowned for their high quality and long life, while remaining a cost effective solution.


The motors have an optimised brush design that allows intermittent operation over one million cycles, and a continuous operating life of 3,000 hours. This long life cycle is achieved while still delivering a high output due to the range's enhanced heat dissipation and resistance.


UK motor supplier EMS has a selection of sample stock of the DMN brushed motor range available for express delivery to accelerate development of automated equipment. EMS also has a selection of complementary gear heads, reduction ratios and encoders available to suit a variety of manufacturing applications.

After the challenges of the pandemic, the UK manufacturing sector is now seeing a sharp rise in demand. Manufacturers must prepare their factories to accommodate the increased volume of orders. Facility managers who widely implement automated equipment designed with reliable and cost effective components can quickly scale up production to meet rising demand.

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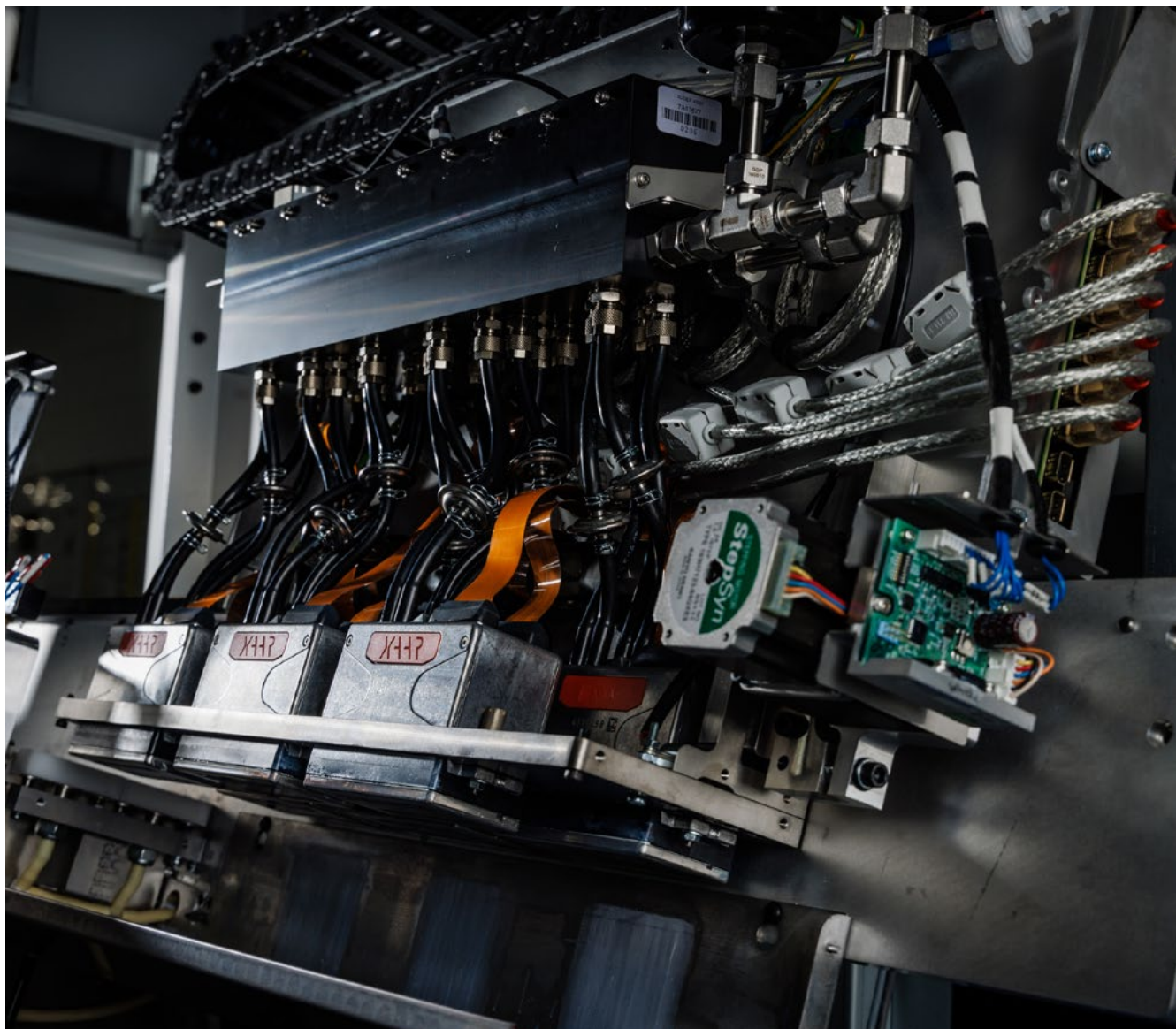


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Xaar's guide helps new users explore the possibilities of inkjet

Xaar has launched its guide to help those new to inkjet maximise the potential of this extremely versatile non-contact technology.

The ability to apply a wide range of fluids with precision and accuracy across a variety of different substrates and materials, is seeing inkjet grow in importance to today's manufacturing processes. Increasingly, it is either replacing traditional production methods or delivering new applications.

Titled, 'Your guide to a successful inkjet development project', the guide will help readers learn more about what to consider when starting their inkjet

development journey, including 'Why digital inkjet?', 'What fluid do I use?' and 'What system components do I need?'.

From the need to use difficult fluids on a variety of substrates, to the ability to print in multiple orientations, the guide encapsulates Xaar's 30 years of experience in a single resource, to demonstrate how a wide range of industries can now seize the opportunity of inkjet technology.

Graham Tweedale, Chief Operating Officer at Xaar said, "Inkjet is enabling a multitude of new manufacturing applications, yet as a technology it can seem daunting to the uninitiated.

"That's why we've created this guide; to help inform our customers' inkjet development journey and assist in delivering a successful outcome with the shortest possible time to market. Ultimately, it will help businesses take advantage of on-demand and variable data printing, reduce waste, and deliver an improved return on investment – all through exploring the possibilities of inkjet."

Users can download a free copy of the guide from the Xaar website [here](https://www.xaar.com).

For further information, please visit www.xaar.com



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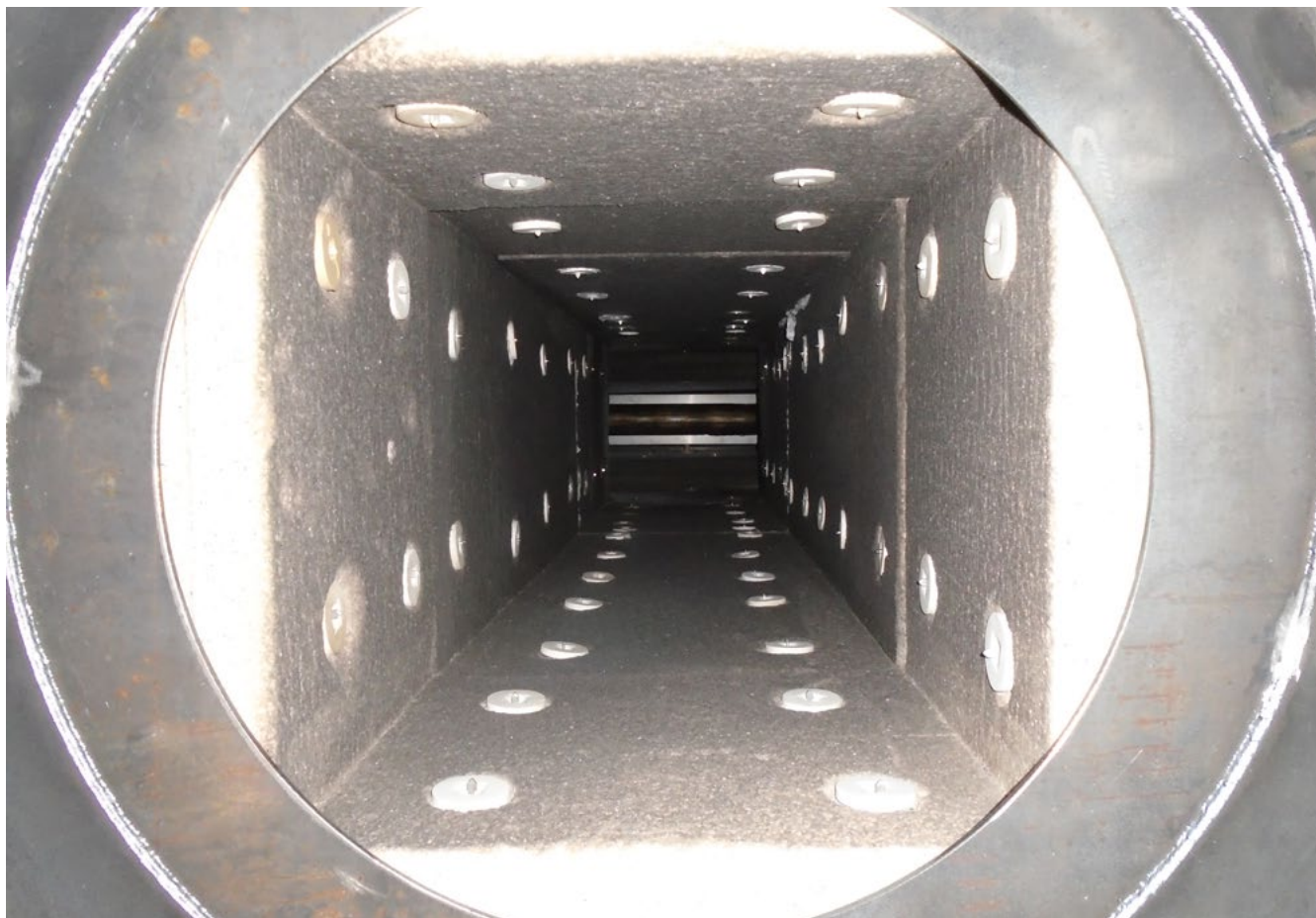
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Waste not, want not

Chris Horsley, Process Engineering Director at Babcock Wanson, looks at the innovative development of Supercritical CO₂ technologies in industrial waste heat recovery

Heat recovery has become increasingly popular within industry, driven by high energy prices, environmental regulations, and a desire to reduce carbon footprint. However, sites and processes vary dramatically, so heat recovery systems are frequently bespoke in nature or, at the very least, require extensive modification of existing equipment and expert installation.

To truly make heat recovery appealing to users, the energy efficiency of these systems needs to be improved to reduce ROI time, and installation made far simpler.

The EC Horizon 2020 grant funded I-ThERM project, coordinated by Brunel University London, set out to do just this. The project was divided into three areas, with Babcock Wanson involved in the recovery of heat from temperatures above 300°C using a Supercritical Carbon Dioxide System.

When Carbon Dioxide is held at, or above, its critical temperature (31°C) and critical pressure (73.8 bar) it turns into a fluid state, known as Supercritical Carbon Dioxide (sCO₂). sCO₂'s thermal stability and non-flammability,



makes direct heat exchange from high temperature sources ranging between 350°C - 800°C possible. Furthermore, its physical footprint is simple and compact, and it has a low toxicity and environmental impact. All of which make it potentially appealing when it comes to heat recovery systems.

Designing and building a Supercritical Carbon Dioxide Heater presented a host of new challenges, as not only does the heater have

to contend with very high temperatures, it would also be used for testing so needed to be adaptable.

Following several briefings and learning more about the process and the testing regime, we built a specialist Direct Process Air Heater, using our MIXBLOC Heater as the starting point as it is designed to provide high temperature air with no flue gas losses. MIXBLOC can operate using the process air flow as the source of combustion air, or an independent combustion air fan.

The heater was designed for operation at up to 780°C air temperature with heater lockout set at 800°C. Burner turndown ratio was retained at 5:1. The process fan size was specifically selected to account for the higher head loss associated with operation at higher working temperatures and with a heat exchanger located close to the heater outlet.

A final discharge cooling system was included, comprising of air cooler with variable speed fan to allow the final exhaust to be cooled to around 350°C irrespective of the heat absorbed into the sCO₂.

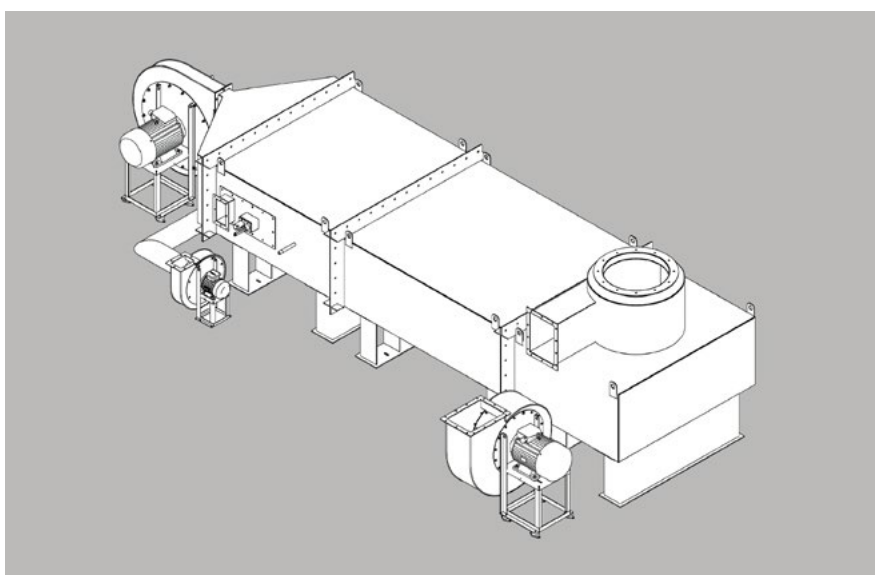
As the heater was being designed for a test site, we manufactured and supplied a 2m “dummy” section between the combustor and cooler to allow the system to be fully commissioned and operated without the very specialist heat recovery unit being in place. This means the system can be tested at varying heat load/temperature and air flow settings without the heat recovery unit being present to allow for the test protocol to be formalised and proved without risk to the heater battery.

A further adaptation to accommodate the test conditions included the mounting of the combustion chamber section on roller type feet to allow it to be moved to ease the installation of the differing heat exchanger sections.

Both the heater and cooler unit are made of carbon steel construction throughout and are fully ceramic lined (including the dummy section) to cope with the high operating temperatures. The system is natural gas fired and we also supplied a gas booster to provide up to 70 mbar of lift, plus a suitable in-line gas meter with analogue input to the MIXBLOC heater control system to display and re-transmit the gas consumption under test conditions.

The final unit consisted of a fully packaged plant complete with all controls and interfaces for both local and remote monitoring plus remote adjustment of set parameters prewired and mounted to the heater. Control is via Siemens PLC with touch screen HMI.

The innovative heat recovery technology developed by the I-ThERM project has



already received significant interest across Europe from industrial organisations – especially those within the steel, cement, glass and petrochemical industries - looking to reduce their energy consumption and emissions whilst also increasing their global competitiveness. With an electrical power output of 50 kilowatt-electric (kWe), the sCO₂ system is expected to deliver energy and GHG emission savings in excess of 15% and ROI of under three years.

The technology has been recognised by the EC's Innovation Radar, which identifies the most promising innovations. Professor Savvas Tassou, I-ThERM project coordinator and Director of the Institute of Energy

Futures, Brunel University London, states: “The supercritical CO₂ waste heat-to-power cycle is a unique technology and the first complete system to be operational in Europe.” The project has further funding to develop advanced heat exchanger and controls for full scale industrial sCO₂ heat to power systems.

Babcock Wanson offers a complete range of products and services for boiler houses and other process heating needs.

For further information, please visit www.babcock-wanson.com



Cimcorp modernizes intralogistics with software-driven automation

The company will showcase its automated order fulfillment solutions at Europe's leading intralogistics exhibition, LogiMAT in Germany



Intralogistics system integrator, Cimcorp, will be exhibiting at LogiMAT, which takes place from 31 May to 2 June in Stuttgart. The global company will demonstrate its holistic solutions to ramp up the intralogistics of major players in the food retail industry. Cimcorp meets customers' supply chain challenges by integrating its advanced robotic technologies and software with leading-edge material handling systems.

NETTO MARKEN-DISCOUNT AUTOMATES LOGISTICS CENTER WITH CIMCORP

German food retailer Netto Marken-Discount, boasting the largest range of groceries in the discount segment, is automating its logistics for fresh produce with Cimcorp, making Netto the

very first German retailer to use this system.

"Getting fresh fruit and vegetables from producers to the retail floor is an absolute race against the clock," says Christina Stylianou, Head of Corporate Communications at Netto Marken-Discount. "In many cases, only a few hours pass between receipt at our logistics centers and delivery to our stores. In Cimcorp, we have found a service provider to supply us with a solution for fully automated order picking of ergonomically packed fruit and vegetable pallets, a solution that meets the requirements of our stores – fast, reliably and cost-effectively."

If the system is successfully commissioned, the retailer plans to

implement additional automated logistics systems at its other storage locations. Cimcorp has already successfully deployed automated facilities in the fruit and vegetable sector in other European countries.

FRESHNESS IS PARAMOUNT

Cimcorp solutions are designed to speed up warehouse operations, which is vital for perishable food items in order to maximize their freshness.

"Freshness is synonymous with quality in grocery retail," explains Kai Tuomisaari, Cimcorp's VP, Sales. "With limited sales windows for fresh food, faster order processing means that freshness is maximized at the retail store, giving a longer shelf life for perishable products."

SOLVING TOMORROW'S CHALLENGES

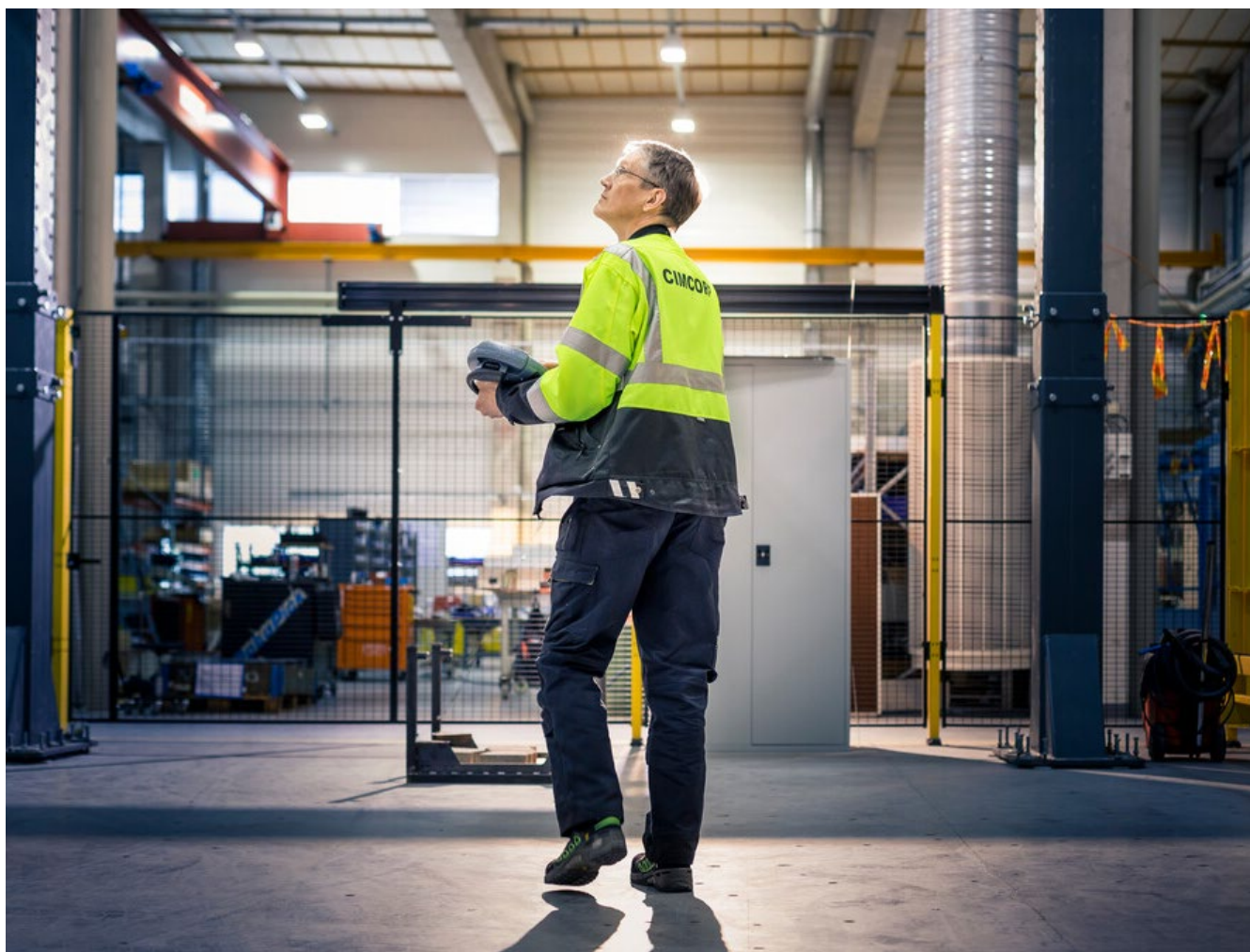
With fresh food, especially perishables, time is essential. The faster products can be delivered to stores, the longer they will be on sale – resulting in more profit.

Automated systems fulfill orders in stages so new products can arrive and be picked immediately to guarantee freshness. Cimcorp's solutions are designed to meet the modern demands of distribution, including shorter lead times, SKU proliferation and challenging seasonal peaks amid labor shortages. The company has developed unique order fulfillment and storage solutions for the tire, food and beverage, retail, e-commerce, fast-moving consumer goods (FMCG) and postal services industries.

MEET THE TEAM AT LOGIMAT

Visitors to LogiMAT are invited to discover more about Cimcorp automation for warehouse and distribution applications and book a meeting with the Cimcorp team at the company's booths (Hall 1 #1B81 & Hall 1 Gallery #10G90).

www.cimcorp.com



Portescap's new miniature motor R&D facility increases customisation capability

The design and development of miniature motor motion solutions is integral to applications from medical equipment to robotics through to industrial power tools, in settings that demand performance and reliability. Concept design, development and testing not only has to be rigorous and relevant to specific application conditions, but also has to be fast enough to meet the needs of demanding markets. As a result, Portescap, which develops miniature motors for global OEMs, has enhanced its R&D capabilities by creating a new Engineering Lab.

The Covid-19 pandemic meant that fast reaction was needed. A key requirement for the medical care of patients who had contracted the virus was the use of ventilator machines, and with high and urgent demand, new machine designs were needed that could rapidly fill the gap. A ventilator OEM in India turned to Portescap's Mumbai team for a fast yet reliable motion solution. The company's new Engineering Lab had recently come on-line at Portescap's Mumbai facility, which allowed a suitable miniature slotless, brushless DC (BLDC) motor to be designed, tested and then brought into production quickly.

"While Portescap has R&D expertise and facilities in Switzerland, the United States and in India, the new Engineering Lab in Mumbai has enhanced the company's ability to quickly develop new products for production, meaning a faster time to market for our customers," says Dheeraj Saxena, Portescap's global head of research & development.

The new Engineering Lab has been developed to enhance miniature motor design across worldwide markets. Ideally located in close proximity to the company's India production facility, the expertise of the Mumbai Engineering Lab team will develop solutions for customers in India selling globally, as well as supporting the company's international R&D capability which creates products for use worldwide.

The facility will develop miniature motors to standard designs for large-scale markets, where the Mumbai team will assist Portescap's global R&D capability in bringing new products to market. In addition, a particular focus



for the Engineering Lab includes custom OEM projects.

"Our DNA is to provide custom motion solutions, and that's where we work very closely with customers," says Dheeraj. "The Switzerland and U.S. teams have their own expertise, and the new Mumbai Engineering Lab will support the customisation development for customers worldwide."

In the US, the focus for Portescap is to design and develop slotted BLDC custom motion solutions to maintain its leading position in the surgical motion solutions market. Meanwhile, Portescap's Switzerland team designs and develops BLDC slotless motion solutions motors manufactured in Mumbai.

The new Engineering Lab means that the Mumbai team will now also support BLDC slotted flat motion solutions for the global robotic and surveillance market in addition to its expertise with DC and stepper motion solutions. This covers applications such as surgical robots and surgical tools, ventilators, medical infusion systems, as well as industrial power tools. The facility will also focus on emerging markets, enabling Portescap to utilise its technology to meet new demand, part of the company's 'Dream, Develop, Deliver' concept.

"Our approach covers theoretical designs and prototyping through to manufacture. It helps us create the highest performance, most reliable motion solutions for compact applications, and also enables us to accelerate the development of a miniature motor package for the

benefit of our customers. The new lab is integral to this," explains Dheeraj.

Important for standard products but crucial for bespoke development is the proof of concept stage. As part of this, the new Mumbai lab includes in-house 3D printing, enabling the team to rapidly create and test designs. This can involve customising standard parts for fast delivery, utilising existing projects from the company's customisation portfolio, or creating entirely new designs.

"With 3D printing we've been able to manufacture parts that would have been difficult to manufacture otherwise, especially at high speed and using new materials, so the ability to achieve this in-house is certainly advantageous for our customers for fast development," says Dheeraj. "The capabilities of the new lab will also help our global teams receive prototype parts more quickly from our Mumbai factory, speeding up application development around the world."

To validate concepts and prototypes for production, the Mumbai Engineering Lab includes testing across all miniature motor characteristics, such as performance, torque and noise, as well as life testing to ensure long-term reliability of motors for critical applications. Specific to Portescap's customisation ethos, the new lab is also able to recreate field conditions for dedicated applications. Simulation techniques in virtual and live situations include aspects such as direction of rotation with variable load.

Facilities at the new lab include an environment chamber to test a motor against various temperatures and humidity, as well as an autoclave tester for sterilisation applications such as surgical hand tools. The lab also includes an NVH (noise, vibration, harshness) chamber for analysis over varying duty cycles. In addition to the latest test technology, the facilities require subject matter experts to optimise the procedures.

For more information,
visit www.portescap.com



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Blowing hot and cold

LAES and the future of energy storage

Liquid Air Energy Storage (LAES) facilities provide a new way of storing electrical energy. Using large gas compressors to turn air into liquid, LAES provide a method of storing this pressurised energy for future use. With no geographical constraints, little environmental impact and no depletion on scarce materials, it's no surprise that LAES have been cited as the future of energy storage. But, what does it take to get a LAES facility operational? Here, Marek Lukaszczuk, marketing manager for WEG Europe and Middle East explains.

LAES, alongside other energy storage options, will prove to be critical as the world continues to transition to renewable power. Renewable sources, such as wind,

solar and tidal – while they are far less damaging to the planet than fossil fuels – are notoriously difficult to predict. This fluctuation creates issues when balancing energy supply and demand.

Consider this as an example. A wind farm operating in the North of England may have several days of intense energy generation due to high wind speeds causing consistent movement of the plant's turbines. However, if the United Kingdom's wider energy grid is already saturated with power, there becomes a dilemma of where to store the wind farm's excess energy.

As the world continues to transition to

renewable power, the challenge of storing energy – and the ability to quickly release it when demand is high – is becoming a significant conversation in industry.

HOW DO LAES WORK?

LAES facilities can provide a solution to fluctuating energy supply. Their large gas compressors turn air to a liquid and then store it in insulated, pressurised tanks, which keeps it as a liquid.

In order to generate power, the air is then heated and allowed to expand again, and the pressure pushes a gas turbine around to generate power. Using this method, energy is stored, and the only emission created in this environment is air.

Air turns to liquid when refrigerated to -196°C, which is usually achieved by a cycle of compression, cooling and expansion, it can then be stored in conventionally insulated, ambient pressure vessels at very large scale. Exposure to ambient temperatures causes rapid re-gasification and a 700-fold expansion in volume, which is used to drive a turbine and create electricity.

Several years ago, WEG took part in a project designed by Highview Power Storage, to deliver the world's first full scale LAES.

MAKING LAES OPERATIONAL

Highview Power Storage's technology drew from established processes

from the turbo-machinery, power generation and industrial gas sectors.

Stuart Nelmes Head of Engineering at Highview explained, "The beauty of this system is that each component part of the process is built using tried and tested technology, which we know works and has established performance parameters. The centrifugal fans sourced from Halifax Fan, one of the UK's leading suppliers, driven by WEG motors, one of the worlds most recognised brands, therefore fitted our remit very closely."

"The LAES system comprises of three primary processes: a charging system, an energy store and a power recovery stage," Nelmes continued "The energy efficiency of each stage is crucial to

the economic viability of the project. Because we have to power the system with the electricity we generate or buy it from the grid the energy efficiency of each component is very important."

"Halifax has developed its centrifugal range to maximise energy efficiency and WEG offers a very energy efficient IE3 motor as standard so this also influenced our decision. Every little helps in this situation."

The energy storage plant uses the same principle used to make your kitchen fridge cold – but more akin in scale to the effect you see freezing moisture in the air creating slabs of ice that crack off the surface of a space rocket as the fuel tanks empty. In the aforementioned project, Highview needed a very reliable, well-proven blown air solution to regulate the temperature and airflow around some of the key components in the system and so the Halifax Fan / WEG combination was a good option.

In addition, WEG's after sales service and extensive support network could ensure that the technology would be reliable for years to come.

GREEN MACHINES

A key benefit of LAES are their green credentials. Once constructed, the commercial installations will be close to environmentally neutral, as the output is simply air. Or in the case of this test unit, inert Nitrogen supplied by BOC, which makes up 78 per cent of the atmosphere.

LAES are very effective for storing energy from renewable sources such as wind turbines, solar panels and tidal pools. Particularly, when there is a grid surplus as it provides a method to store and then feed energy back into the grid when demand peaks.

These facilities have masses of potential for the future of energy storage. And as the world continues to aim towards ambitious emission reduction targets and renewable energy goals, energy storage will become a crucial mechanism of balancing energy supply and demand.



More information on WEG and its support and experience in energy storage, generation and other power related projects, please visit www.weg.net

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