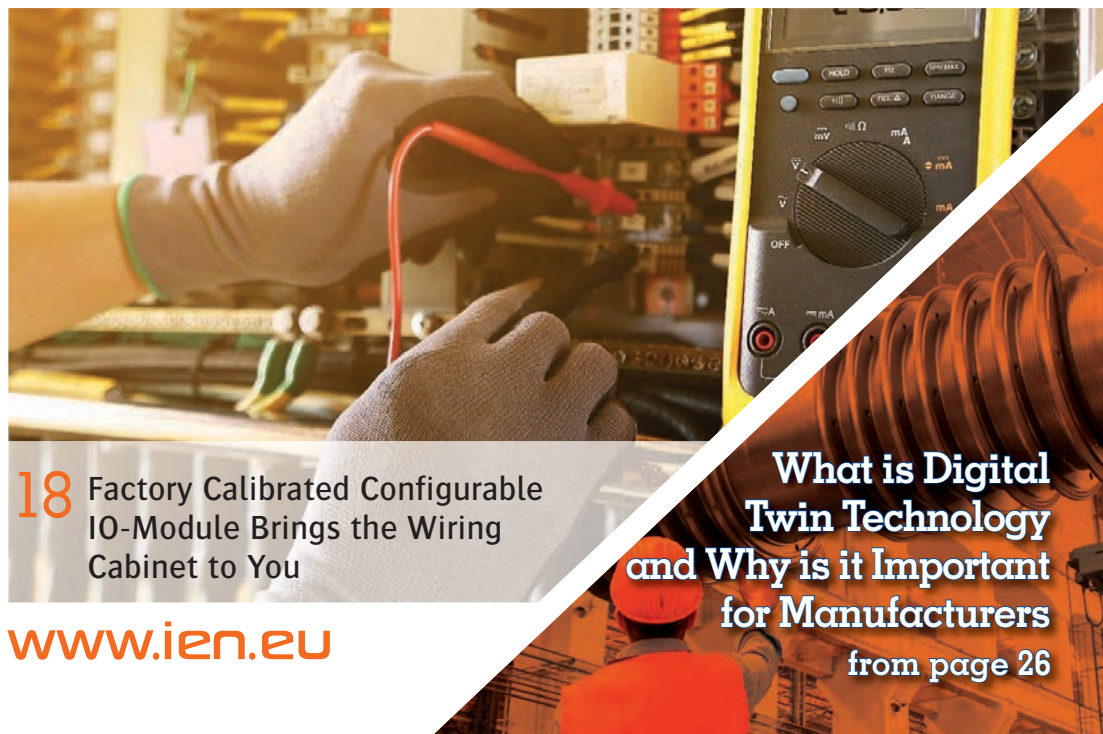# NOVEMBER

IEN europe

INDUSTRIAL ENGINEERING NEWS

When Being Digital Does Not Necessarily Mean a Solution Is Smart

Digitalizing industrial production plants not only requires economic considerations for sustainable success, but also an emphasis on interoperable solutions.

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What is Digital Twin Technology and Why is it Important for Manufacturers
from page 26

Anis Zenadji
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Dear Readers,

This last issue before 2023 continues the journey through digital automation and smart manufacturing. In the meantime, take a look at our webmags to come before the end of this year!

You will have the opportunity to learn more on collaborative robots and digitalization through all its aspects with great pieces from industrial specialists such as Mitsubishi Electric, Pepperl+Fuchs, AMD Xilinx, or Analog Devices. Regarding cobots, Oliver Giertz, Product Manager at Mitsubishi Electric, explains how these are helping manufacturers to increase flexibility, boost quality, and drive down operational costs.

On digital automation and "smart" solutions, the Pepperl+Fuchs article develops the fact that digitalizing industrial production plants not only requires economic considerations for sustainable success, but also an emphasis on interoperable solutions. Only then will results be achieved that are objectively "smart."

In addition, with new individually configurable standard products, automation specialist SCHUNK sheds light on how to reduce complexity in system planning and also offers individual adaptation options for a wide range of applications.

Last, take a look at the AMD Xilinx editorial on adaptative computing. Digital transformation is critical to remain competitive and deliver value for customers with early manifestations such as converging operational and information technology networks, deploying predictive maintenance, and automation using robots to raise throughput and eliminate human errors.
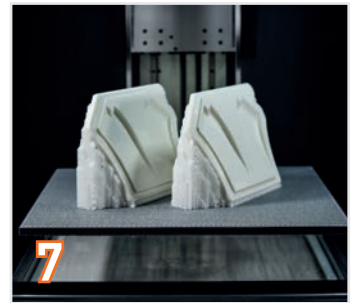
We wish you a pleasant and interesting reading

Anis Zenadji

Editor for IEN Europe

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Advantech at SPS 2022: Fostering Intelligence and Sustainability

Advantech uses the SPS 2022 exhibition to set out how its products and solutions can help enable an intelligent and sustainable planet.

From Booth 370 in Hall 7, Advantech sheds light on its latest innovations for artificial intelligence (AI), wireless and wired communication, device management and data aggregation, automated guided vehicles (AGVs) and robotics, and sustainability and ESG (environmental, social and corporate governance).

At SPS, the world's leading trade fair for smart and digital automation, Advantech showcases how manufacturing and process plants investing in its intelligent IIoT solutions will see returns both financially and environmentally. Advantech hosts several partners that represent the company's unique 'go-to-market' strategy. These partners, who have the technological know-how to bring to life smart automation projects, are joined by the Advantech's ECO-partners.

AI is among the technologies taking center stage on the company's 120m² booth. Advantech can provide a series of edge AI modules, AI inference systems, edge intelligence servers and IoT gateways to accelerate AIoT development. Hardware and software advances from Advantech and its co-creation partners are making AI at the edge even easier to implement, enabling increased performance and greater flexibility.

The company also showcases its reliable wired and wireless communication solutions. Advantech products include industrial Ethernet switches, gateways, cellular routers, wireless access points/clients, media converters and serial device servers. All of these contribute to transmitting data securely, while monitoring and controlling networked devices. Elsewhere on the booth, SPS visitors will discover Advantech's device management solutions, including WISE-DeviceOn. This fast and simple to set-up IoT platform manages connected devices remotely and provides centralized management features, including data aggregation and analysis.

Those undertaking AGV and robotics projects can find out about Advantech's broad offer for these applications at SPS 2022, including the latest industrial ATX motherboards and GPU solutions for ground control systems. The company can also provide a range of innovative products for the mobile control system and communication infrastructure, helping AGV and mobile robot developers to expedite projects and shorten time-to-market.

The common denominators among all of these solutions from Advantech are sustainability and ESG. An ongoing commitment prevails at the company to building sustainable supply chains that focus on green design, green manufacturing and green products.

Jash Bansidhar, managing director – Europe at Advantech, says: "Considering our core competitiveness and key development strategies, we aim to leverage our AIoT core competencies and smart solutions to improve machine builders gain greater efficiencies. By streamlining manufacturing process Advantech can help meet UN Sustainable Development Goals for improved energy efficiency, energy-saving in buildings and manufacturing plants, and low carbon emissions in logistics and retail."

No single one partner's abilities fit all possible projects, so there are multiple partners on hand to show a variety of successful applications. SPS visitors have the opportunity to discover more for themselves on the Advantech booth where they can find interactive videos and a speakers' area, providing an ideal platform for the company's in-house experts and partners to deliver informative presentations.

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## TE Connectivity to Showcase Latest Products at Smart Production Solutions 2022

TE Connectivity will showcase its wide portfolio of products and solutions at Smart Production Solutions (SPS) in Nuremberg, Germany, Nov. 8-10. "As the go-to engineering partner with innovation leaders and technology entrepreneurs, we're excited to showcase our latest solutions at SPS to help our customers solve their toughest challenges with advanced connectivity and sensors solutions," said Emmanuel Dieppedalle, vice president - commercial at TE. "Customizable and interconnected solutions, such as Single Pair Ethernet, industrial robotics, industrial automation and controls, will be discussed at the show, helping our customers in virtually all facets of production. Our TE experts will also give updates on our recent acquisition of electronic connectivity provider ERNI, which expands our connectivity portfolio to assist more customers." In addition, the TE booth will feature two cobots performing tasks, a hands-on servo motor and servo drive display, and a programmable logic controller demo. Design and product experts will give updates on SPE technology as well as the latest trends in robotics, motions and drives and automation control.
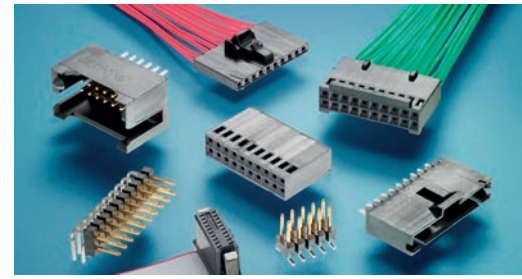
SPS 2022: New Command Device Series for Food-processing Machinery

The H series from **Schmersal** will be showcased at SPS 2022, as a full range of new command and signalling devices for hygiene-sensitive applications, particularly food processing. Characteristic features of the range of command and signalling devices are gap-free transitions between sealing elements and surfaces and an absence of protruding parts. The command elements are easy to clean and so well sealed that they can withstand regular cleaning with high-pressure cleaners and aggressive cleaning agents. The new series meets the requirements of DIN EN ISO 14159 (Safety of machinery - Hygiene requirements for the design of machinery) and the latest version of EN 1672-2 (Food processing machinery - Basic concepts). This standard sets out very precise specifications for the hygienic design of all command elements

at the human-machine interface (HMI) of food-processing machinery. Also taken into consideration was a new regulation, which formulates the requirements relating to the selection of materials for this particular area of use (Regulation 10/2011/EU).

Energy transition, e-mobility and increased process automation.

At SPS 2022 **Schaffner** (Hall 4, 351) will focus on three key trends. As modern society is becoming increasingly digitalized and electrified,

everything — from the smallest device to the largest system depends on smart technology to function reliably and efficiently. Regarding energy management, Schaffner's EMC products protect electronical systems from grid distortions, prevent disturbances, and maintain a reliable supply of electrical energy. On e-mobility, Schaffner products and solutions are supporting the e-mobility revolution with electromagnetic interference solutions for everything from power electronics, onboard chargers, batteries and keyless authentication systems. For increased automation, by minimising electromagnetic and harmonic interferences Schaffner support reliable and stable production processes and ensure an efficient flow of energy. As electromagnetic experts, Schaffner can provide reliable solutions that reduce the complexity of designing for electromagnetic interference — allowing design engineers and innovators to focus on their inventions.

Turck Group Appoints Further Managing Director

Stefan Grotzke is the new Managing Director of **Werner Turck GmbH & Co. KG** as well as of Turck Holding GmbH. The 53-year-old will take over the management of Werner Turck GmbH & Co. KG together with Dr. Michael Gürtner. On the management board of Turck Holding GmbH, Stefan Grotzke will take over the areas Production & Supply Chain Management (SCM), while Dr. Michael Gürtner will continue to be responsible for Development & IT. The Managing Directors of Hans Turck GmbH & Co. KG, Christian Wolf and Christian Pauli, will be in charge of Sales & Marketing as well as Finance, Human Resources & Legal in the Turck Holding. Stefan Grotzke has extensive cross-industry experience in the areas of production and supply chain management in international companies. After studying production engineering and then economics at the University of Applied Sciences in Bielefeld, he was responsible for setting up various production facilities in Germany and abroad for a leading global industrial gases and engineering company.

Stratasys to Demonstrate Automated Post-processing Cell for Additive Manufacturing at Formnext

The company will showcase an expanding portfolio of materials as well as a the P3 Automated Production Cell, a demonstration project to improve the efficiency of operating fleets of Origin® One 3D printers.

Stratasys, a leader in polymer 3D printing solutions, will showcase additive manufacturing solutions for every stage of the product value chain at Formnext (15-18 November, Frankfurt am Main, Germany) under the theme "Let's Talk Manufacturing". It will include an expanding portfolio of materials as well as a the P3 Automated Production Cell, a demonstration project to improve the efficiency of operating fleets of Origin® One 3D printers.

Making the future of manufacturing a reality
The demonstration project production cell operating in the Stratasys stand (Hall 12.1, D121) is designed to automate the movement of parts between multiple 3D printers and post-processing equipment for cleaning, drying and curing. The goal is to significantly reduce the labor resources required as 3D printing scales up on the factory floor.

Advancing Urban Mobility
Stratasys will also be showcasing its support for innovation in urban mobility with a new vehicle category in the booth. The working prototype was developed by Stratasys customer nFrontier using both 3D printing and traditional manufacturing.

Materials to drive production growth
With the goal of enabling manufacturing customers to address new applications with demanding requirements faster and more efficiently, Stratasys has continued to grow its materials ecosystem through new partnerships and third-party material options. Materials on show will include Stratasys Preferred and Validated materials for Stratasys 3D printers based on five different 3D printing technologies: stereolithography, SAF™, FDM®, P3™, and PolyJet™. These include materials provided by partners such as Arkema/Kimya, Victrex plc, and Covestro.
"Over the last two and half years, our focus has expanded from building up our hardware portfolio to working with key industry partners to develop a wide-range of use-case-specific solutions. These complete solutions encompass hardware, software, materials and services that create new business opportunities for our customers," says Andy Langfeld, President EMEA at Stratasys. "We continue to accelerate cutting-edge developments in additive manufacturing and advance our strategy of providing the best and most complete polymer 3D printing portfolio in the industry."

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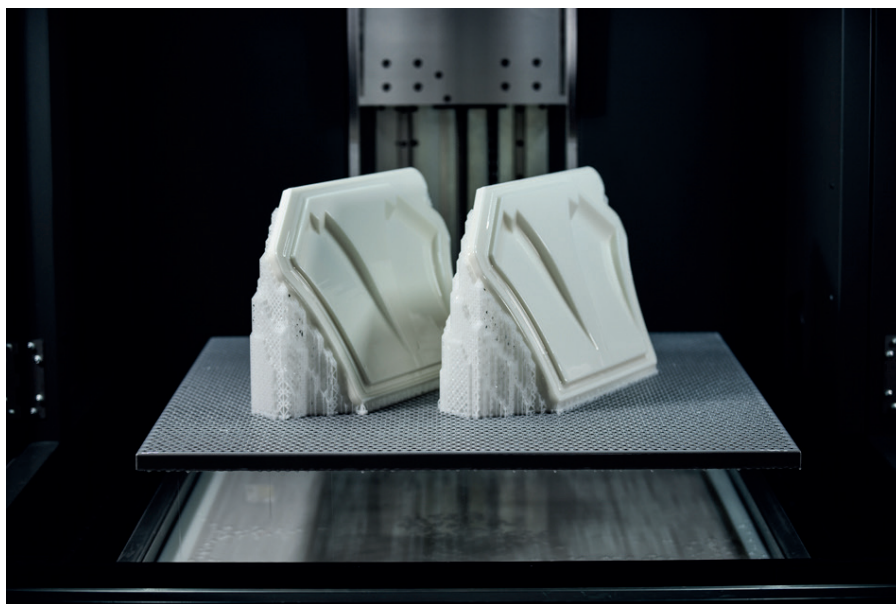
Parts printed with Covestro's Somos® PerFORM resin with a Neo® stereolithography 3D printer. Stratasys has been dramatically increasing the polymer materials options available to its customers, including agreeing to acquire the additive manufacturing materials business of Covestro. The progress of that strategy will be on full display at Formnext.

SCHURTER's Sustainability Report 2021

In times of climate change, there is an increasing awareness for the topic of sustainability. SCHURTER intends to take action with a new path as shown in this report through a conversation with Thomas Schurter, Chairman of the Board of Directors of SCHURTER Holding AG, and Ralph Müller, CEO of SCHURTER Holding AG.

SCHURTER's choice of materials has a significant effect on the conservation of natural resources. The company take this into account when developing new products and updating existing components.

Environmentally compatible product development

The choice of materials used in the final product is decided during the early stages of product development. Material changes at a later time therefore often come at substantial expense. For this reason, our development engineers are obligated to focus not only on technical functionality but also on environmentally compatible product design as well as the appropriate choice of materials. This is ensured by means of corresponding work packages and milestones in the standardized project sequence. Furthermore, various projects deal with the use of more environmentally friendly alternative materials. In addition to introducing Greenline products made from organic-based plastics, we are working on eliminating components that contain halogens from our product portfolio.

Many isolating components made from polyvinyl chloride (PVC) are used in current projects and will no longer be considered in future developments. Moreover, two projects have been initiated that aim to substitute lead in the product range. On the one hand, this concerns alloys in turned and stamped bent parts that contain lead and on the other hand, investigations have been launched with an external research partner to seek possible alternatives for high-temperature soldering for reflow-compatible fuses.

Avoiding chlorine and lead are just two ways to reduce the quantity of toxic substances. The ecological objectives in terms of environmentally compatible substances are further developed on a project basis and adjusted to the current technological capabilities.

Material consumption

In 2021, we processed 524 tonnes of metal and 400 tonnes of plastic throughout the Group. Most of the metal used is recycled. In the case of the plastics, the recycled proportion currently accounts for a maximum of 20 to 25 per cent due to the high safety requirements for live components. Here we are working on the use of alternative materials that may result in a considerably improved ecological footprint.

Project Greenline

The market launch of the Greenline will contribute to a product portfolio that conserves resources. Selected products are alternatively also offered from sustainably produced plastic materials. Conventional poly amides based purely on crude oil are being replaced by novel polymers based on renewable resources. Technological feasibility could already be demonstrated. Approvals for use in electrical and electronic applications have been initiated and are expected to be issued in 2022.

Packaging

The primary packaging of our products is assessed and optimised in the development phase in terms of the materials used, the number of different materials and its volume and weight. To visualise the effectiveness of ecological packaging development, we are currently working on comprehensive, waste-related data collection that will enable us to identify more precise optimisation potential.

Cogniteam and 634AI Partner to Create Smarter, Safer, and More Efficient Mobility in Industrial Spaces

Nimbus by Cogniteam and MAESTRO by 634AI are joining forces aiming to reduce operational expenses and boost safety in warehouse robotics.

Cogniteam, developers of Nimbus, the robotics drag-and-drop operation system, is partnering with 634AI, developers of MAESTRO, a proprietary AI-powered centralized control tower that enables effective and harmonized indoor operations. This will help 634AI incorporate proven robotic software into its unique fork-based Autonomous Mobile Robot (AMR) development.

Nimbus was created to expedite robotic ventures by supplying a proven echo system for development, deployment, management, and seamless cloud connectivity. A natural fit with
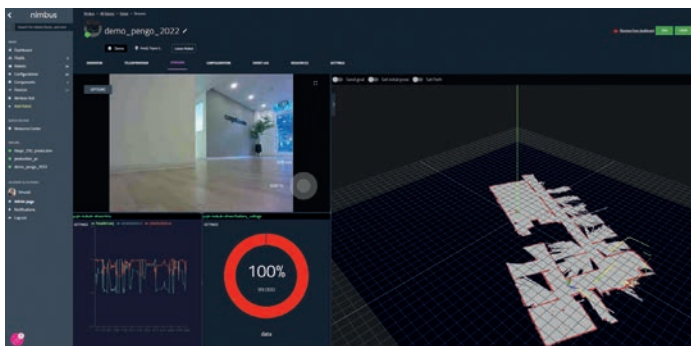
Cogniteam's Nimbus

634AI's vision of the future of robotics and its MAESTRO platform, which aims to give superpowers to the most ordinary industrial spaces. Its semantic analytics, generated from a panoptic view of the floor, enables customers a fully coordinated operation of anything mobile – real-time safety alerts for man-driven vehicles, or navigating fleets of generic autonomous mobile robotic platforms, through a unified and flexible modular system, with greater safety.

With many other industries having incorporated robotics into their sector, 634AI believes that warehouse operations can improve their safety by welcoming autonomous machines. Bringing together these two technologies will help speed up introducing to the market 634AI's unique AMR. Cogniteam's involvement in the Israeli government's Human-Robot Interaction (HRI) Consortium means that Nimbus will allow robots to better understand and anticipate human behavior while working in potentially hazardous human-robot environments.

Developing a robot from scratch, including ideation, development, hardware testing, software testing, and finally, deployment, means a new robotics system will reach the market in approximately 6 years. "We created Nimbus to help expedite new robotics ventures by supplying a proven ecosystem for development, deployment, management, and seamless cloud connectivity," said Dr. Yehuda Elmaliach, CEO & Co-Founder of Cogniteam.

Amongst warehouse machinery, forklifts are the most common piece of equipment, making up 850,000 units throughout the United States, only. Forklifts demand skilled operators, with extensive training on proper usage. Due to labor shortages and various operational reasons, 50% of today's forklifts are used inefficiently. More than 11% of these are involved in accidents, placing forklift accidents on OSHA's notorious list of top 10 Most Frequently Cited Standards.

Oren Levy, CEO of 634AI, said "For those who are integrating technology into their facilities, it is often an inefficient patchwork that puts operations and worker safety at risk. One of our goals is to allow robots to do the heavy lifting, both from worker safety and an operational efficiency standpoint. Cogniteam's Nimbus lets us focus on our IP by freeing us from developing entire robot and fleet infrastructure that can take years to develop in-house."

MAESTRO gives superpowers to the most ordinary industrial space. Its semantic analytics, generated from a panoptic view of the floor, enables customers a fully coordinated operation of anything mobile – be it track and trace movements of goods and equipment, real time safety alerts for man driven vehicles, or navigating fleets of generic autonomous mobile robotic platforms, all through a unified and flexible modular system, with greater safety, at an affordable price.

634AI is on a mission to make a safer and smarter industrial mobility – from the industrial floor to the airport terminal, the warehouse floor or the hospital floor, and beyond.

Yehuda Elmaliah, Co-Founder & CEO of Cogniteam

Cobots Allow Effective High-mix, Low-volume Production

Oliver Giertz, Product Manager at Mitsubishi Electric, explains how collaborative robots are helping manufacturers to increase flexibility, boost quality, and drive down operational costs.

With increased competition, often on a global scale, manufacturers need to differentiate themselves by tailoring products more closely to customer demand. This, of course, carries with it an implicit reduction in batch sizes, and has seen the rise of 'high-mix, low-volume' production. Cobots can enable manufacturers to effectively meet individual customer requirements with greater product variety in smaller batches.

While high-volume production, with its repetitive tasks, has seen increased adoption of traditional industrial robots, we have to think differently in a high-mix production environment where the programming and reconfiguration effort to change from one product to the next can impact on productivity. In high-mix production, there might be several line changeovers needed in a given shift.

For many manufacturers, this has meant an increased reliance on manual labour. But that, in turn, increases operational costs when compared with high-volume production – and the greater the mix, the higher the emphasis on manual labour, and the greater the production cost for a given volume.

Further, high-mix, low volume (HMLV) production requires more stringent quality control processes to be put in place, with the opportunity for production errors increasing as the batch sizes reduces. At the same time, the levels of changeovers between different products can often become a bottleneck.

However, the new breed of collaborative robots (or cobots) is responding to the trend of HMLV production, delivering the required flexibility and the ability to reconfigure processes quickly as well as easily.

Improved flexibility, consistency and reliability

Designed to assist human operators on the shop floor, cobots can take on simple, repetitive and physically strenuous tasks. This offers improved consistency and reliability in manufacturing while enabling humans to concentrate on more complex jobs. A cobot is also
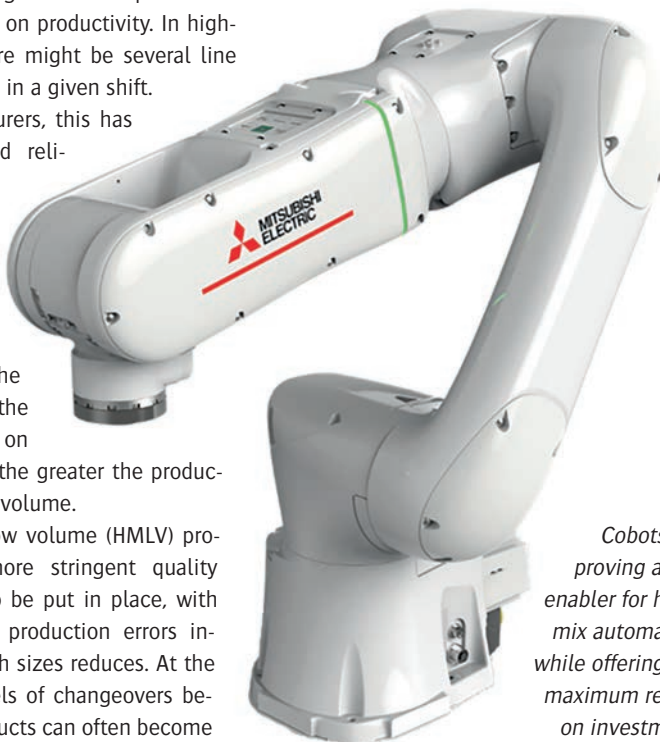
Oliver Giertz, Product Manager for Servo/ Motion and robotics for the EMEA region at Mitsubishi Electric.

flexible and can quickly learn to adapt to a variety of tasks, from picking and placing to machine tending.

A key benefit of cobots is their ease of programming, enabling frequent redeployment and fast set-up without advanced robotic programming expertise. One recent development which can improve the ease and speed of configuration is hand-guided teaching, where the cobot arm is simply moved to the desired position and added to the operational sequence at the press of a button. This technology means that no complex programming is required, and it can also be combined with touch-screen graphical interfaces to implement more sophisticated operations.

A digital twin can also be used to enhance the speed of set-up and redeployment. Employing a digital representation of the physi-

Cobots are proving a key enabler for high-mix automation while offering the maximum return on investment.

Cobots can assist human operators on the shop floor by taking on simple, repetitive and physically strenuous tasks which enables humans to concentrate on more complex jobs.

same time, the increased accuracy of the latest cobots is an important contributor to improving quality in a high-mix environment. As an example, Mitsubishi Electric's MELFA ASSISTA cobots can provide a repeat accuracy of ±0.03mm, making them ideal even for the most delicate and precise tasks.

By moving towards HMLV production, manufacturers are finding that they can differentiate themselves from their competitors, with the ability to tailor products to specific customer requirements, even in the smallest of batches. Further, with the ability to quickly switch production to a different product, manufacturers can become more responsive to changes in the market, delivering an additional competitive advantage.

Cobots are proving a key enabler for high-mix automation while offering the maximum return on investment. In an HMLV production environment, cobots drive up flexibility and reduce operational costs.

cal cobot, including the virtual capability to evaluate performance, the digital twin can simulate cobot interaction to ensure that it can safely and predictably fulfil the desired task before deployment. This ease of programming and redeployment is one of the main enablers of HMLV production and holds the key to reducing operational costs. At the

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OSM-COMPATIBLE SYSTEM-IN-PACKAGE
For industrial and IoT

The System-in-Package (SiP) "MSMP1" from **ARIES Embedded** is based on the STM32MP1 CPU from STMicroelectronics with powerful single or dual Arm CortexA7 cores (up to 800 MHz), combined with a CortexM4 core (up to 209 MHz). It combines compact design and a wide range of services, bringing low power consumption, thermal efficiency and low-cost to embedded systems. The SiP is compliant with SGET's OSM (Open Standard Module) standard. Almost all functions of the CPU are available on the small board measuring only 30 by 45 mm. The 476 contacts of the SiP allow the CPU to be used transparently in demanding uses. It features low power consumption, small form factor, and competitive cost. The modules are scalable in performance and memory expansion and can be adapted to many project needs. They support 512 MB to 4 GB DDR3L RAM and 4 to 64 GB eMMC NAND Flash. The many interfaces include 10/100/1000 Mbit Ethernet, USB2.0 host/OTG, 2x CAN, UART, I2C, SPI, ADC/DAC, a parallel display interface, and camera input. Application areas cover IoT, medical technology, and industrial systems. In addition to a wide range of services, the MSMP1 modules also offer new functionalities in terms of flexibility and processing.

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BOXPC WITH V-BY-ONE AND EDP INTERFACE
High-speed and high-resolution

The trend in the TFT display sector is towards ever higher resolutions and Full HD is increasingly being replaced by 4K or 8K. The LVDS interface is not well suited for the transmission of such large amounts of data. With the new "BoxPC Pro NPA-2009", **Distec** offers a novel docking connector for direct connection of high-resolution V-by-One and/or eDP TFT displays. It is based on an industrial mainboard with the Intel® Core™ i embedded processor i5-1145G7E of the 11th generation. Optionally, the NPA-2009 is also available with the Core™ i7-1185G7E or Celeron® 6305E processors on a project basis. All Tiger Lake processors feature high frame rates, economical power consumption and low latency and are suitable for continuous 24/7 operation. It is ideal for applications that require high-resolution displays with a high frame rate and high color depth, including info terminals, medical technology, and transportation. The docking connector supports USB signals, which makes it possible to connect other devices such as touch and/or webcam via the connector. Additionally, the Box PC could be powered via the docking connectors. The Box PC comes with a variety of other interfaces, such as 2x Gigabit Ethernet, 3x M.2 socket, Audio, 3x USB 3.2, USB-C Alt mode, 2x USB 2.0, 1x RS232/422/485, 1x RS232.

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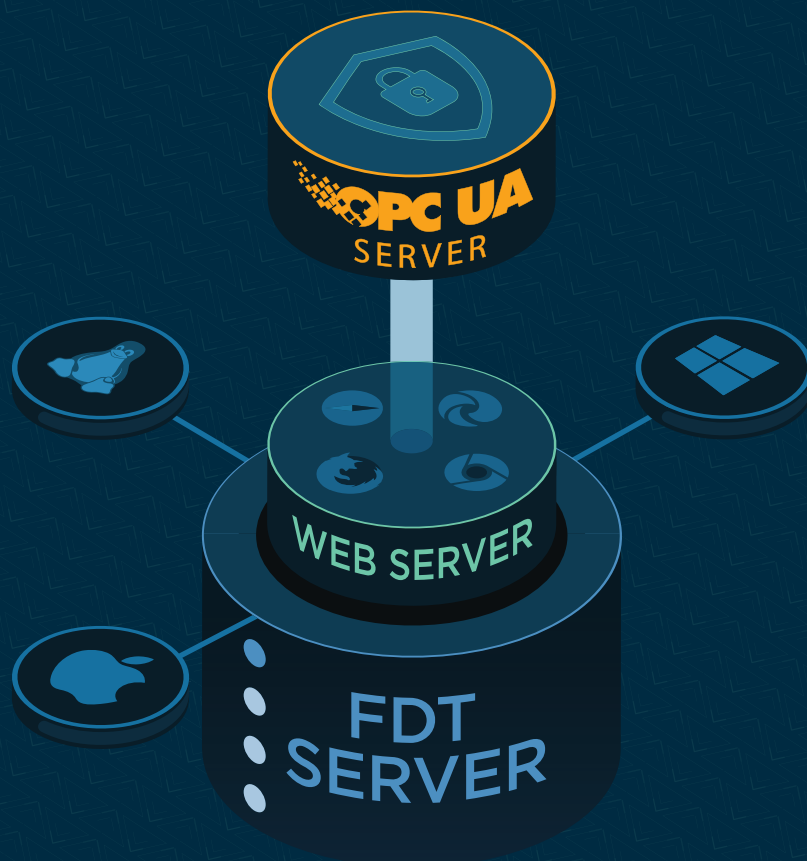
FDT UE Makes IT/OT Data Integration a Reality—Today!

- · Open Interoperable IIoT Architectures
- · Secure, Scalable, and Adaptable Platforms
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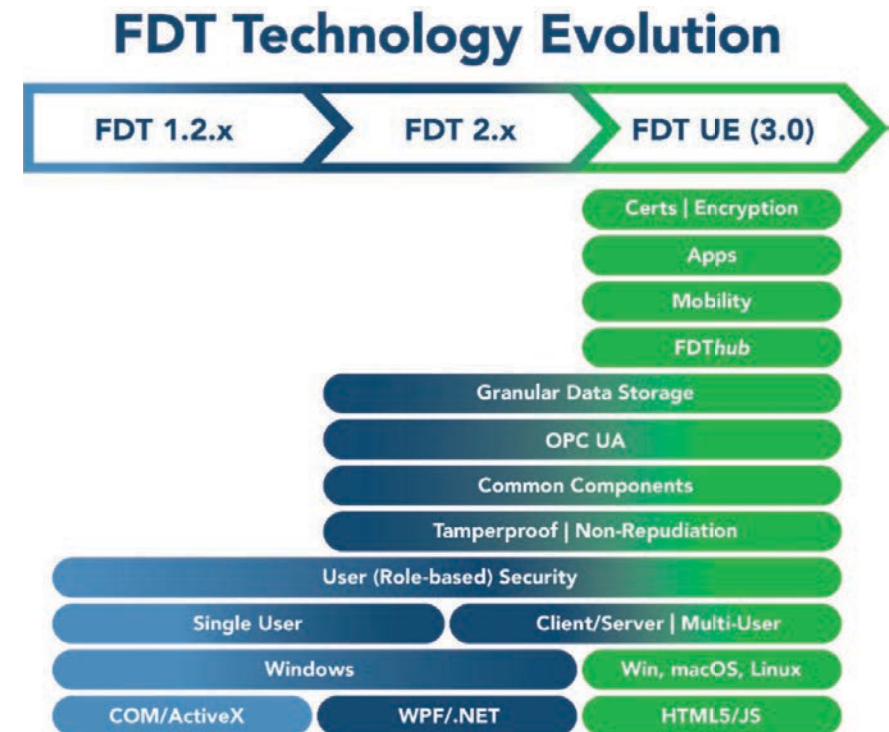
🌐 fdtgroup.org/innovation

FDT®UE

FDT UE Migration for Smart Manufacturing

At the heart of the IIoT is the FDT Group's integration standard. The latest FDT3 embeddable standard has evolved to a distributed, multi-user, client/server approach enabling a FDT Unified Environment (UE) for modern intelligent device integration and lifecycle management. It offers a robust IT/OT data-centric platform with built-in security, mobility, and OPC UA capabilities allowing vendors to offer standardized service-oriented asset management with faster performance, ease of use, and investment protection for the current installed-base.

For end-users, system, and device suppliers, FDT 3.0 is the data interoperability standard for the secure and reliable configuration and visualization in industrial automation devices and systems independent of communication protocol, vendor, device/device type/representation, or information model, supporting all aspects of a modern device and control system lifecycle management. It's a comprehensive solution for improving asset utilization including maintenance, repairs and operations.

Today, millions of DTMs are deployed and serviced by FDT-enabled hosting environments using FDT 1.2 and FDT 2.0. Those DTM-enabled devices can integrate into new FDT UE hosting (Server and Desktop) environments. To take advantage of FDT UE web services and OPC UA capabilities, both device and system vendors need to update their solutions to support the new FDT 3.0 specification allowing IT/OT data consistency via any OPC UA, FDT or mobile client.

From a single-user desktop application for device integration, configuration, and monitoring to a multi-user distributed server application architecture, FDT UE enables modern remote operational lifecycle management.

The vendor community can jump-start FDT UE development with a modernized toolset, known as Common Components, to create next-generation, data-centric FDT Server, FDT Desktop and FDT DTM solutions. These toolkits, available for use with any of the major operating systems, ensure specification compliance, greatly enhance interoperability, and work together to help developers deliver an ecosystem of FDT IIoT-enabled solutions while expediting time to market.

A single device management solution for IT/OT integration, configuration and monitoring is an essential component driving smart manufacturing initiatives and removing barriers to innovative data-centric solutions improving operations, productivity, and the bottom line.

Learn more about FDT UE migration with this new white paper: USE LINK
https://www.fdtgroup.org/resource/fdt-3-0-ue-migration/

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Adaptive Computing for Industrial Applications

Digital transformation is critical to remain competitive and deliver value for customers with early manifestations such as converging operational and information technology networks, deploying predictive maintenance, and automation using robots to raise throughput and eliminate human errors.

Digital transformation is critical for industrial businesses, to remain competitive and deliver value for customers. Early manifestations of this trend include converging operational and information technology networks, deploying predictive maintenance, and automation using robots to raise throughput and eliminate human errors.

Product developers need to deliver solutions to these challenges quickly. A programmable system on module SOM can provide a suitable compute platform on which to start. However, additional firmware and software infrastructure are needed, and a heterogeneous processing engine and integrated programmable logic can add valuable flexibility. Analysing some known SOM-based solutions used in network convergence, predictive maintenance, and robotics can highlight the areas where these additional resources can accelerate development and help ensure optimum performance.

Solution for Network Convergence

Converging Information Technology (IT) with Operational Technology (OT) networks eases the flow of information between systems in the factory floor and the enterprise-level management and strategic decision-making activities; it enables end-to-end communication from the lowest sensor/drive, all the way to the Enterprise Resource Planning (ERP) system. Convergence also eliminates overheads associated with managing two networks.

IT and OT networks have very different requirements. OT networks require real time, low-latency communications and are difficult to scale. IT networks, on the other hand,

Figure 1. SOM-based TSN endpoint. AMD Xilinx's TSN IP core implements these elements using both the programmable logic and processing system of the Kria™ K26 SOM, which contains a Zynq® UltraScale+™ MPSoC. This IP core provides individual interfaces for each traffic class and can be configured with up to two ports that transport all traffic classes over the same cable or fibre.

are easier to scale but not deterministic or provide a guarantee of service. Time Sensitive Networking (TSN), a subset of IEEE 802, facilitates convergence by enabling deterministic communications over Ethernet networks. By providing network management as well as allocating time-defined slots for scheduled traffic, TSN enables different classes of traffic to share the same link.

Correctly implementing TSN requires a solution that can provide a low latency and deterministic response at network endpoints and switches. A suitable platform would comprise an Ethernet MAC, TSN bridge, and TSN endpoint logic (figure 1), as well as software to handle functions like network synchronisation, initialisation, and interfacing with network configuration controllers.

Predictive Maintenance

Predictive monitoring lets equipment operators pre-empt failures and schedule maintenance to happen at convenient times, thereby maximising utilisation and uptime while minimising ownership costs. Implementations can range from cloud-based digital twins to prognostics at the edge for monitoring simple drives and sensor systems. Processing at the edge and communicating the processed data to the cloud is the most viable solution for many industrial applications due to the volume of data and the resulting critical response time of the decision loop. The use of prognostics at the edge can provide significant benefits. For example, operational failure of a CNC machine's spindle can result in a significant impact in costs not only from the damage caused to the CNC machine, but also from the halt in production.

A key challenge, when building such systems, lies in developing machine-learning
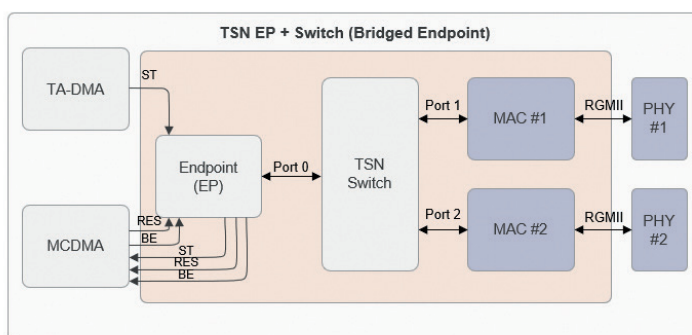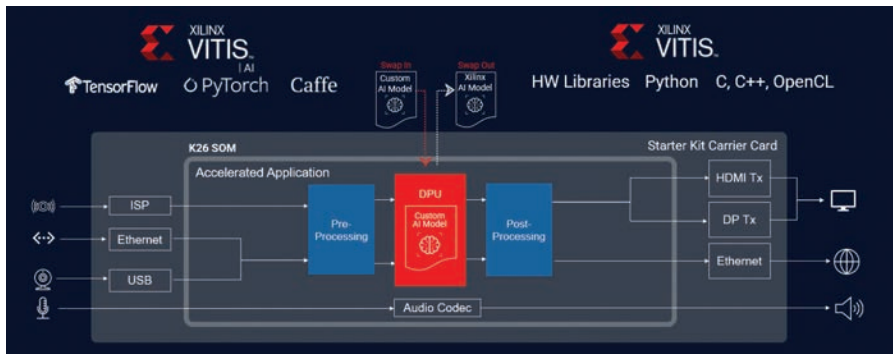
Figure 2. Developing machine-learning applications using a SOM with industry-standard frameworks. Vitis™ AI tools provide a large selection of Deep Learning Processor Units (DPUs) as parameterizable IP cores that are implemented directly in the SOM programmable hardware (figure 2). Starter kits like the KV260 Vision AI Starter Kit include AI-accelerated applications that leverage the Vitis DPUs.

applications for deployment at the edge. A suitable toolkit can help tackle this by providing ready-to-use deployable high-performance machine-learning algorithms that enable developers to build their applications using popular machine-learning frameworks such as PyTorch, TensorFlow, and Caffe.

ROS 2-based Robotics

One of the most critical technologies for Industry 4.0 is the use of robotics to automate the production process. In manufacturing, these solutions can cover a wide range of applications from robotic arms working on a production line, to robots moving supplies and logistics around the manufacturing floor.

A high performance, low latency processing system is critical to interact with the environment safely. In particular, it is needed to control the robot's moving parts, which comprise complex systems of actuators, drives, and mechanics, often called mechatronics. Because robots communicate internally using networks to achieve the required real-time control, a SOM that contains programmable logic brings two advantages. One is
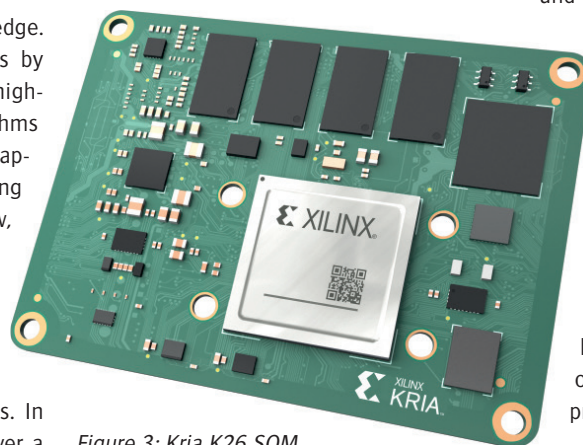

Figure 3: Kria K26 SOM
The Kria Robotics Stack (KRS) from AMD Xilinx supports ROS 2 and introduces enhancements that let developers utilise the Kria K26's heterogeneous processing engine and programmable logic to enhance real-time deterministic performance. It also uses the SOM's Arm® Cortex®-R5 real-time processor to handle management of the Real-Time Publish-Subscribe Protocol (RTPS) at the core of the Data Distribution Service (DDS), which is the backbone of ROS 2.

the ability to support any-to-any interfacing, which simplifies implementing connections to sensors and drives. Moreover, programmable logic can be used to implement deterministic networks, which is critical for the implementation of robot systems.

Many development projects leverage the Robot Operating System (ROS), which comprises a set of software libraries and tools for creating robot systems. While ROS has been recently updated to ROS 2, its native Continuous Integration/Continuous Delivery (CI/CD) development pipeline is designed explicitly for homogeneous CPU-based processing systems.

In addition, monitoring and automation are added to the CI/CD pipeline to improve the process of application development, particularly at the integration and testing phases and during delivery and deployment. This automation minimises the manual execution of each of the steps of a CI/CD pipeline and roboticists to use the same conventions of ROS 2 with the same tooling for parts that are implemented in software or that are offloaded or accelerated in programmable logic. There is also a mechanism to benchmark the execution of a ROS 2 node application, which helps identify bottlenecks and specifically tailor one or more kernels as offloaded kernels in programmable logic.

Conclusion

High-performance adaptive edge computing is a pillar of industrial digital transformation. Programmable SOMs can simplify the creation of flexible, adaptive computing solutions and, with purpose designed IP including software stacks, can accelerate the development of a production-ready model.

Kiran Vishal (KV) Thanjavur Bhaaskar, Manager, Marketing & Strategy - Industrial, Vision, Healthcare & Sciences, AMD AECG

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Customized With Just a Few Clicks

With new individually configurable standard products, automation specialist SCHUNK reduces complexity in system planning and offers individual adaptation options for a wide range of applications.

When buying a car or designing a room, smart 3D configurators have established themselves as a matter of course. Industrial production often still relies on cost-intensive special solutions for production automation, which are associated with a complex process chain and long delivery times. However, ever smaller quantities and a simultaneous increase in customer expectations require short response times as well as affordable and networked solutions that require less intensive planning. The application expert SCHUNK shows a way to implement quickly available application-specific solutions with new configurable product series. The pneumatic and electric grippers, gripper fingers as well as jaws for clamping devices can be individually adapted to the customer's requirements in a maximum of 4 steps. Even without any design knowledge. The license-free, browser-based web tools are freely available on the SCHUNK website.

Two grippers for big things

For handling large, heavy parts, SCHUNK offers two new configurable standard grippers that show their strengths primarily in the packaging, automotive, white goods or logistics industries. Users can choose either the PLG or the ELG, depending on whether they rely on pneumatics or electrics.

The pneumatic PLG 2-finger parallel gripper can be configured in less than 10 minutes. Its profiled rail guide enables the use of long gripper fingers, so it can effortlessly handle even voluminous workpieces from difficult-to-access transport containers with a gripping force of 2,000 N in size 20 to 12,000 N in size 120. It is also suitable for challenging

Due to its large jaw stroke, the PLG long-stroke gripper can cover a large workpiece variance with only one set of gripper fingers. It can be easily customized via an online tool.

operating conditions such as high robot acceleration. Its large jaw stroke can be adjusted with millimeter precision from 100 mm to 400 mm. Users with high parts variation save here, because the PLG covers them with just one set of gripper fingers. In addition, it offers increased safety through optional integrated process monitoring. Due to an optional pre-mounted pressure maintenance valve, it reliably maintains the gripping position and force even in the event of a pressure failure. The powerful gripper is available in 5 sizes and offers a variety of possible applications owing to the numerous configurable extra features.

The electric ELG long-stroke gripper is the latest highlight among the configurable SCHUNK grippers. It covers a range of applications comparable to that of its pneumatic

counterpart, but is actuated by an electric drive with a freely adaptable servomotor. The gripper can be finely adjusted and continuously positioned over the entire stroke from 100 to 400 mm. The cycle time in the handling process can be reduced by pre-positioning the fingers. It has a unique force-stroke ratio and offers an instantly available and controllable gripping force of up to 3,000 N in size 30 to 12,000 N in size 120.

The electric ELG long-stroke gripper has a unique force-stroke ratio and offers an instantly available and controllable gripping force.

Gripper fingers to suit the workpiece

Thanks to SCHUNK, the in-house design and production of workpiece-specific gripper fingers is no longer necessary. The design has become extremely simple due to the new finger configurator FGR and not only saves 50% of the costs, but also valuable time and resources. Eight standardized basic geometries ensure you find the right shape, which

The finger configurator FGR enables customized gripper fingers for all pneumatic and electric SCHUNK grippers.

can be individually adapted to the requirements of the workpiece in the second step. The aluminum fingers can be combined with numerous SCHUNK electric and pneumatic grippers and free customized labeling is available on top.

Individual standard chuck jaws

The new jaw configurator easyJAW offers over 500 different standard variants of top jaws. Those who cannot find what they are looking for in the world's largest chuck jaw
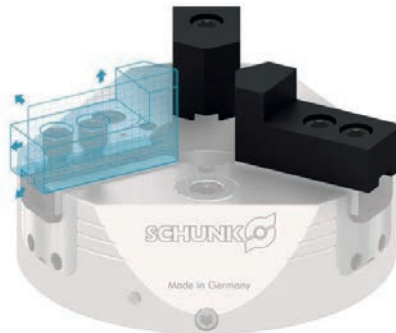
The new jaw configurator easyJAW offers over 500 different standard variants of top jaws. The geometry, material, weight, interface, and many other parameters can be customized in the online tool.

program consisting of 1,200 jaw types can now effortlessly design their own soft top jaws, full grip jaws or monoblock jaws. The geometry, material, weight, interface, and many other parameters can be customized in the online tool. Users thus have access to customized special chuck jaws in 1 to 3 weeks. With the new planning tools, the application expert offers practical building blocks that take the customized solution path to a new level.

After configuration, users have the option of downloading the planned solution directly in any CAD format, requesting an offer or ordering directly – always with transparent pricing and current delivery times. No more time-consuming in-house solutions and weeks of design time – thanks to the new SCHUNK configurators for grippers, gripper fingers and jaws.
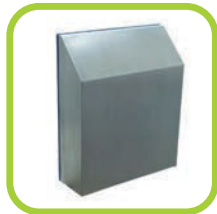
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Factory Calibrated Configurable IO-Module Brings the Wiring Cabinet to You

The requirement to manually rewire and calibrate IO interfaces has so far been a limiting factor in regard with maximum adaptability and flexibility. A remotely configurable IO reference design now provides a clear roadmap for future IO modules to provide ultimate flexibility and configurability.

Modern industrial networks now support advanced protocols that allow real-time remote monitoring and configuration of sensors on the factory floor, greatly reducing production downtime. However, connecting sensors and actuators to a process controller at the wiring cabinet is still a manually intensive and sometimes frustrating task. For example, if a process modification means a valve being driven by a Digital Output (DO) voltage must be changed to one using a 4-20mA Analog Output (AO) current, a technician must visit the wiring cabinet and physically move the valve connections from a DO channel to an AO channel, either by routing the wiring to a different IO module or by changing the IO card (if a rack type module is being used). A similar scenario occurs if a Digital Input (DI) sensor must be changed for an Analog Input (AI). While automation engineers select IO modules to have sufficient channels (allowing for some redundancy) at the commissioning stage of a new process, the continuous addition of sensors and actuators can mean that, over time, there are fewer spare channels available, potentially leading to an awkward scenario where there are insufficient channels of a particular type to accommodate further changes. A spare DI is not much use to a technician who needs an AI channel when none are available. Adding a new (and costly) IO module may not even be possible within the confines of a tightly packed cabinet. When the requirement for different IO channel types to be periodically recalibrated is also factored in, the amount of manual intervention and associated production downtime quickly adds up.

Process automation engineers surely yearn for a universal IO channel that can be configured (and calibrated) remotely to perform any function (input or output, voltage or current) for any signal type (analog or digital) with no need for a technician to visit the wiring cabinet. In this Design Solution, we briefly revisit the main features of sensor and actuator signals used in industrial environments before introducing a new reference design that clearly signposts the path to the holy grail of the process automation engineer – the factory calibrated, remotely configurable universal IO module.

Digital IO
DI and DO signals are typically DC voltages in the range 0-24V. DIs are used to detect discrete liquid levels, for object detection or to indicate the state of a pushbutton switch. DOs are used to drive mo-
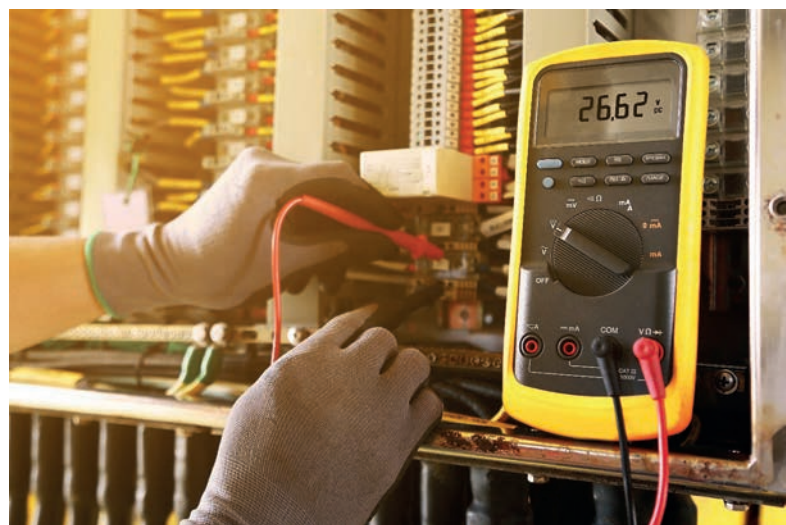

Figure 1 Technician adjusting connections at wiring closet

tors, actuators and to energise solenoids. These come in a variety of configurations – high-side, low-side and push-pull depending on how the load is referenced, with drive current being the main specification, ranging from hundreds of milliamps to several Amps.

Analog IO
Analog IO signals are either an electrical current in the range of 4-20mA or DC voltages typically in the range of 0-10V (although bipolar options and wider voltage ranges are available). AIs receive signals from sensors used to make precise measurement of quantities such as distance, pressure, light etc, while AOs are used to precisely control the movement and position of actuators.

Temperature
In industrial environments, temperature measurement is primarily performed using one of two types of sensors – a thermocouple (TC) or a Resistance-Temperature Detector (RTD) with 2- 3- and 4-wire variants. Thermocouples are robust, operate over a wider temperature range and are relatively inexpensive compared to RTDs which are more stable, provide higher accuracy and have better linearity. Signal
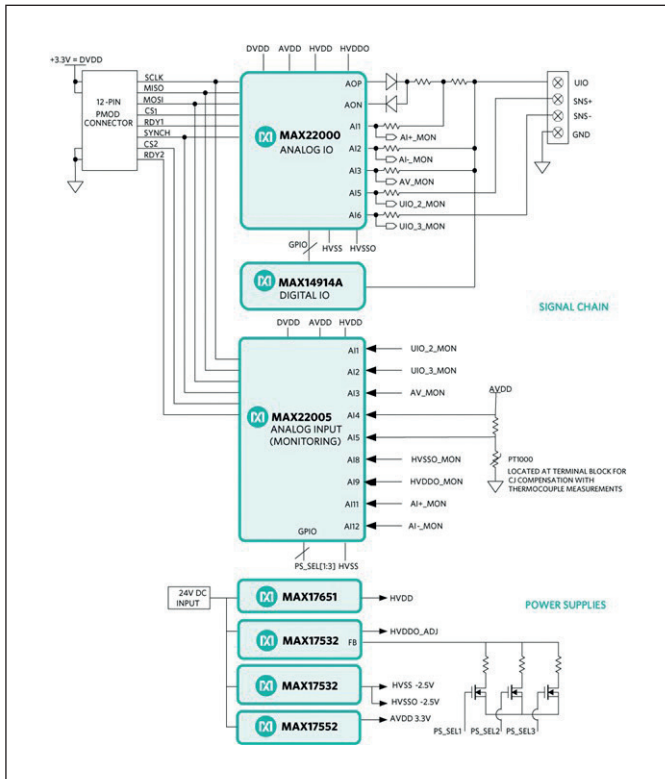
Figure 2 Functional diagram of the MAXREFDES185# Universal IO Module Reference Design

output levels depend on the type of TC/RTD used and may be connected to AI channels. Robustness (as exhibited by compliance with the IEC-61000-4 transient immunity standards) is a key performance criterion for all types of industrial IO interfaces.

Universal IO Module Reference Design

Increased integration means that in more recent IO modules, individual channels can be configured to function as either an input or an output, but the analog and digital domains remain separate. Figure 2, however, illustrates the functional diagram of a reference design for a new type of IO module in which a single universal UIO pin can be configured, using software, to function as either an AI, AO, DI, DO with respect to a single ground pin (GND). The configurable modes include analog voltage input (0 to +10V), analog current input (0 to +20mA), analog voltage output (0 to +10V), and an analog current output (0 to +20mA). It also incorporates an IEC 61131-2 Types 1, 2 or 3 compliant 0-24V digital voltage input and a push-pull/high-side digital output (capable of driving up to 1.3A of current). It also

supports temperature measurements using a resistance temperature detector (RTD) and provides built-in cold-junction compensation for thermocouple measurements. The use of an industry-standard four-way PCB terminal supports UIO mode as well as 2-wire, 3-wire or 4-wire temperature measurements.

The module's AI and AO functions are realized using the MAX22000, a software configurable analog input/output IC that can operate in either voltage or current mode. Analog output signals are generated using its internal 18-bit DAC, while the integrated 24-bit ADC has a low-noise PGA with high-voltage and low-voltage input ranges to support RTD measurements. The DI and DO functions are realized using the low-leakage MAX14914A, a high-side/push-pull driver that can also be configured to operate as a DI. Apart from providing DIO functionality, the MAX14914A also monitors the output current in both high-side and push-pull mode. A logic level corresponding to the state of the DO can be polled via a GPIO on the MAX22000 GPIO, a necessary feature in safety-critical applications.

Software Configuration

The module uses an industry-standard 12-way Pmod™ connector popular on many microcontroller and FPGA platforms. For easy testing the module can be configured via a software GUI with a USB-to-SPI adapter, such as the USB2PMB2#, providing the physical interface to the board. The GUI has two tabs - the Universal IO tab (Figure 3) has a drop-down menu to allow selection of analog or digital, input or output configurations. Depending upon the mode selected, the GUI displays a simplified block diagram of the internal connections to the IC which enables the currently selected function.

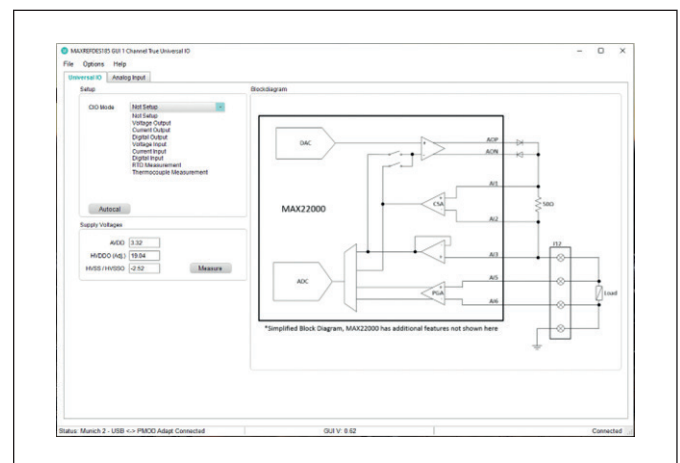The Analog Input tab can be used for monitoring purposes, allowing

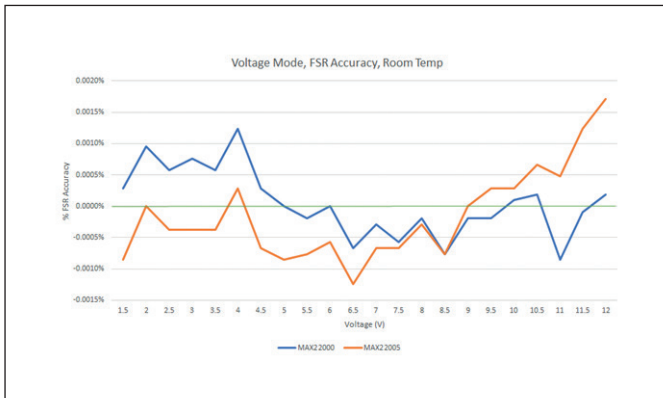*Figure 3 Universal IO Tab of GUIModule Reference Design*

Figure 4 Voltage measurement accuracy

Figure 5 Temperature measurement accuracy

the voltage or current signal appearing at the UIO pin to be visually compared to that being measured by the MAX22005, a 12-channel 24-bit analog input device. Hex values are also provided for easy correlation between the two ADC cores.

Calibration

A major benefit of this module is that voltage and current calibration can be performed using the on-board MAX22005, a 12-channel, factory calibrated analog input IC that acts as a reference and also monitors analog signals present at the UIO pin. It is factory calibrated to be accurate to 0.02% FSR at 25°C and exhibits 0.05% FSR over ±50°C. Calibration is performed by clicking 'Autocal' on the Universal IO tab of the GUI. Figure 4 illustrates the FSR accuracy of the analog voltage signals present at the UIO pin and at the MAX22005, both comfortably outperforming the 0.02% FSR expected for precision instruments and exhibiting a high degree of correlation.

A similar level of accuracy is demonstrated for current measurement, while Figure 5 shows the accuracy of temperature readings using a Fluke 724 calibrator to emulate a PT100 RTD sensor. Accurate to within 1°C between -100°C to +300°C, it is comfortably within 0.02% FSR at room temperature. Total accuracy for the complete module is up to 0.1% FSR for ±50°C temperature variation.

Power Optimization

A power tracking feature limits the amount of heat dissipated by the module. This is achieved using a combination of a low quiescent current linear regulator and high efficiency buck converters. With a quiescent current of only 8µA, the MAX17651 provides a regulated 24V supply from the DC input while the MAX17532 and MAXM17552 buck converters generate multiple analog output supply voltages, one of which is programmable to five different preset values between 4.2V and 24V. This is done using GPIO pins on the MAX22005 to switch in feedback resistors using external FETs. The module typically consumes 10mA under norma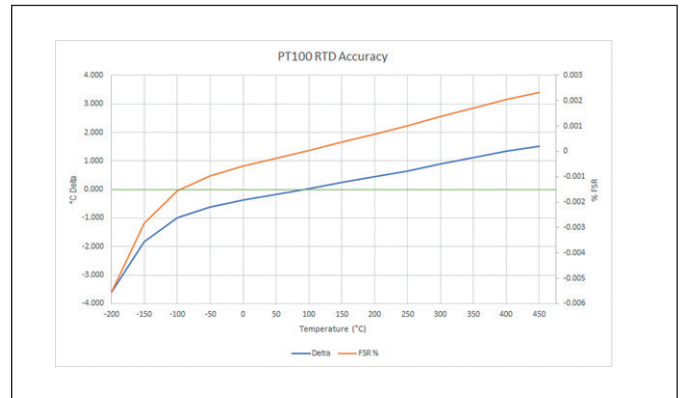l conditions, but this increases if either current input or current output mode is selected. A green LED indicates the presence of an external supply.

Robustness

While not immediately transferable to field applications in its current form, the module nonetheless exhibited a high degree of robustness when tested for the transient immunity requirements specified for industrial equipment in IEC 61131-2. It withstands up to ±1.0kV of 1.2/50µs surge with a total source impedance of 42Ω. Surge testing (line-to-line and line-to-ground) was performed using ten surge pulses, with the module continuing to operate normally without damage. Data and control registers on the device ICs were not corrupted and communication via the host adapter was uninterrupted. The module was also found to withstand electrostatic discharge (ESD) up to ±4kV port-to-ground, for contact and airgap discharge, when tested at the field connection terminal block. No damage was observed, and host communication continued normally after testing. The front view of the module, which has a tiny 75mm x 20mm form factor is shown in Figure 6.
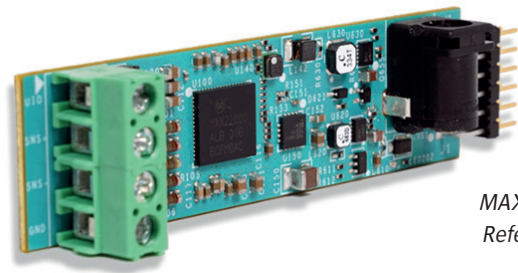

Figure 6
MAXREFDES185#
Reference Design

Figure 7 clearly demonstrates the flexibility and space-saving benefits of choosing a single universal IO module (UIO) that can perform four separate functions, which can be configured and calibrated remotely using software, to replace several standard modules, each performing only a single function and requiring manual configuration and calibration.
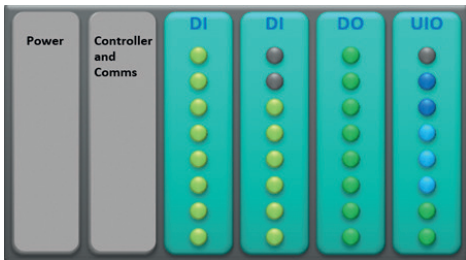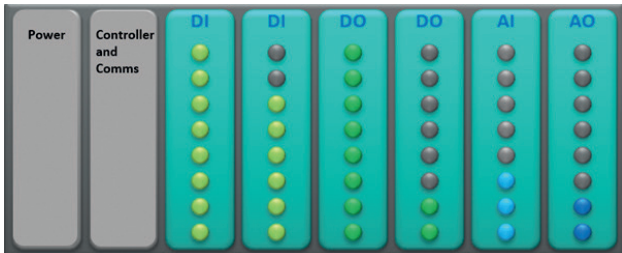
Figure 7 One universal IO module replaces several standard modules

Summary

Industry 4.0 requires industrial equipment with maximum adaptability and flexibility. The requirement to manually rewire and calibrate IO interfaces has so far been a limiting factor in this regard. The MAXREFDES185# remotely configurable IO reference design now provides a clear roadmap for future IO modules to provide ultimate flexibility and configurability.

Apart from IO modules, this reference design and its component ICs are also suitable for applications in PLC and DCS systems, smart sensors and actuators.

Sean Long, Executive Director, Applications for the Industrial and Healthcare Business Unit at Maxim Integrated®, now part of Analog Devices and Konrad Scheuer, Senior Principal Member of Technical Staff at Maxim Integrated®, now part of Analog Devices

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AI INFERENCE SYSTEM FOR DIN RAIL

With Intel® CoreTM i5-1145G7E CPU

The DRPC-240AI from **ICP Germany** is a compact embedded system that can be mounted on the DIN rail. The DRPC-240AI is prepared to accept the MUSTANG-V100-MX8, an accelerator card for AI applications. Together with the MUSTANG card, eight Intel® Movidius™ Myriad™ X MA2485 VPUs are available in addition to the processing power of the Intel® CoreTM i5-1145G7E. These provide excellent inference performance per watt, 16 SHAVES cores for AI calculations and native FP16 support. Intel® "Open Visual Inference Neural Network Optimization" (OpenVINO™) supports the Mustang accelerator card, providing end-to-end acceleration for a variety of neural networks. OpenVINO™ allows CNN (convolutional neural network) based pre-trained models to be deployed at the Edge with little effort. Training models such as AlexNet, GoogleNet, Tiny Yolo, Squeezenet, resNet and many more. Pre-installed are 8GB of DDR4 memory and a 256GB 2.5″ SATA SSD. The DRPC-240AI also offers one i225LM 2.5GbE network port, three i225V 2.5GbE with TSN/TCC functionality, two USB3.2 and USB2.0 each, as well as two RS-232 and RS-422/485 interfaces each with 2.5kV isolation, six digital inputs, six digital outputs, one HDMI with a resolution of 3840x2160 pixels and one display port with 4096x2304 pixels.

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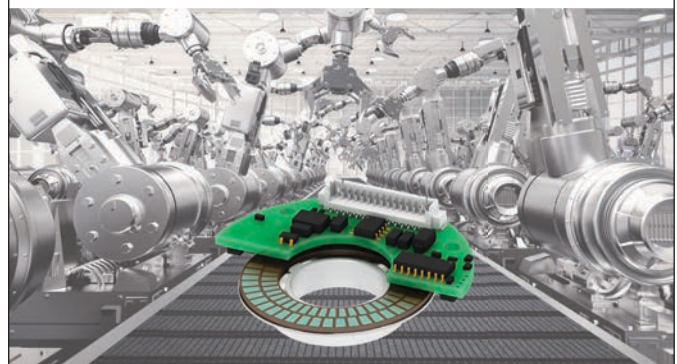# Being Digital Does Not Necessarily Mean a Solution Is Smart

Discussing the Opportunities, Risks, and Side Effects of Digitalization Projects

Digitalizing industrial production plants not only requires economic considerations for sustainable success, but also an emphasis on interoperable solutions. Only then will results be achieved that are objectively "smart."

Why should machines and plants be digitalized and "smart"? It always seems desirable to be able to talk up your company using positive concepts like these, and to create marketing buzz. But at the end of the day, it is a question of achieving measurable monetary returns to justify the unavoidable costs. Only then is a digital solution also smart.

The processes to be digitalized should there-fore be assessed before any action is taken. It goes without saying that they need to make sense, but attention should also be paid to effective and consistent processes. It may be possible to achieve the effects of a "smart" solution simply by adapting or modifying processes.

One of the key motivations behind digitalization is clearly the ability to obtain information—be that about the status of plants, machines, and devices, the position of products and equipment, or about the status of a production order. While increasing transparency in this way does not in itself improve throughput or efficiency, it opens the door to further, targeted measures.

The actual situations will obviously be very different, but there are essentially two scenarios:

- The information is not available and needs to be generated using suitable sensor technology that must be newly installed in the production environment.
- The information is already available, but is not available where it would be useful at the right time or in a suitable format.

In both cases, data must first be collated and stored in a structured manner.

Many applications that rely on "smart" data require larger amounts of data that need to be stored for longer periods of time. In addition, high levels of computing power that are scalable are often required, such as for detecting anomalies in predictive maintenance systems. At the automation level, i.e., in the controllers and industrial PCs, storage capacity and computing power are both usually scarce and expensive. On the other hand, cloud-based data platforms or data platforms operated "on premise" provide both storage capacity and computing power at comparatively low costs and in a way that is also scalable.

Actual "IoT" data processing is therefore carried out using IT systems of this kind and it must be easy to find ways to transfer the data from the automation level to the system. Simply put, the information is generated on the shop floor and is required on the office floor for storage and further processing.

However, none of these scenarios require completely new approaches, and appropriate technologies are available. Instead, the challenges lie in safely negotiating the boundaries between automation and information

Only interoperable solutions are smart

From IO-Link to Ethernet with modules from Pepperl+Fuchs

technology, because these areas are usually managed completely separately, to meet sometimes very different requirements. For example, two completely independent networks are usually operated in parallel.

Industry 4.0 and the IIoT are driving a convergence of IT and OT, and a whole range of concepts and solutions have now been developed for this purpose.

Only Open Solutions Are Smart

When evaluating digitalization solutions, the fact that in the vast majority of cases production environments are heterogeneous must be considered. Components from different manufacturers have to interact with each other without creating the need for time-consuming major adjustments. If they don't, the solution may be digital, but it is anything but smart.

When it comes to the output signals provided by the sensors, interoperability is easy to achieve due to the wide-spread acceptance of standardized protocols such as IO-Link, AS-Interface, and Ethernet-based fieldbuses.

Using signal converters, sensors that use other common output signals can also be integrated into these standards. For example, Ethernet to I/O modules are available that can be installed in the field or switch cabinet to convert from IO-Link to Ethernet.

While standardization has already been introduced on the shop floor, connecting to cloud services still uses predominantly proprietary connections. Most of these are based on well-known standardized mechanisms such as MQTT and REST APIs, but varying degrees of programming are required specifically for the respective platform.

The same applies to communication between applications at the cloud level. Again, definitions are inconsistent, and there are absolutely no uniform semantics.

Digital Twins in Particular Should Be Open and Cooperative

Many software and hardware product manufacturers promote the provision and use of digital twins. However, the term is misleading; the solutions are usually proprietary and can

only operate in well-defined environments with specified products from a few vendors. Digital twins like this do not allow for truly open and therefore smart cooperation.

In contrast, the Asset Administration Shell (AAS) implements a fully interoperable approach. An AAS contains the complete semantic description of all kinds of components in a defined structure and is therefore also a perfect format for exchanging all of the relevant data for a product. The AAS is divided into different sub-models, and each of these sub-models describes a specific distinct aspect.

The International Digital Twin Association (IDTA), an offshoot of ZVEI and the VDMA, was founded as a central organization with the purpose of managing and maintaining the sub-models to ensure uniform definitions are used and to avoid ambiguities and duplication.

The AAS concept is also supported by the Open Industry 4.0 Alliance (OI4). A large number of companies (around 100 members as of the end of 2022) from automation and IT have joined forces in this alliance, and have developed a reference architecture for integrated and open industrial communication. This architecture allows the parallel integration of information from different sources at the cloud, sensor, and actuator levels. Industrial plant operators can connect all of their field devices, only have to implement the OI4 cloud connection, and can access any number of different manufacturer portals, for example.

For these reasons, a digital solution in industrial production can only be regarded as "smart" if it is based on recognized and established standards, and ensures broad openness for products from as many different manufacturers as possible.

Emerson Launches Advanced Dust Pulse Technology Control System

The ASCO DPT Control System provides superior monitoring, optimizing dust collector system performance and increasing uptime

Emerson's new ASCOTM DPT Control System optimizes the performance and improves the efficiency of filtration and dust collector systems by providing accurate and reliable low-level particulate monitoring, early warning leak detection, enhanced cleaning control and real-time diagnostics.The connected system serves as a cost-effective, scalable and purposeful step toward a facility's digital transformation. It is now available in Asia-Pacific, Europe and Middle East and Africa regions, with availability in the Americas by mid-2023.

Using traditional sensing technology, low-level leakage is hard to detect in environments with high operating pressure, high humidity or oil and steam. The advanced signal processing of the DPT Control System helps ensure accurate, low-level measurement and detection of particles of less than 1 milligram per cubic meter in harsh, high-pressure (maximum 7 bar) and high-humidity applications, like those found in the cement, power plant, incineration, finishing aluminum and chemical industries.

"The digital transformation of the process industry is underway and connected facilities around the world are seeing the valuable sustainability and operation cost reducing benefits that real-time monitoring and diagnostics deliver," said Stephan Cocciardi, director of marketing and global strategic accounts with Emerson's discrete and industrial business. "The sophisticated monitoring capabilities of the ASCO DPT Control System can help facilities detect issues and prevent problems that would otherwise waste energy and accrue unplanned downtime, resulting in a more efficient and reliable dust collection system."

By closely monitoring dust collector systems in real time, the DPT Control System can help users locate and address leaks before they become issues, improving energy efficiency and compressed air consumption savings. The loop-powered sensor enables intrinsically safe monitoring of difficultto-access points of the filtration system, including coil, diaphragm and filter bag. The system's condition monitoring and predictive maintenance capabilities can improve system reliability and efficiency while reducing maintenance costs and unplanned downtime. Its superior linear output can help users track real-time particle emissions levels and meet emissions regulations.

In addition to monitoring, the DPT Control System optimizes the performance and uptime of dust collector systems of all sizes through efficient and reliable pulse-jet filter cleaning control. For facilities that use large baghouses, application-specific control algorithms can reduce pulsing frequency, which can extend filter life and reduce the amount of compressed air consumed.

The control logic can maintain quite low and stable differential pressure during operation and automatically maintains differential pressure within ±25 Pa (±0.1 inch) of water column of set point while minimizing pulsing. This ensures consistent cleaning performance, maintains a proper filter cake and can reduce compressed air use by 15% to 40% over standard, on-demand cleaning and up to 90% over continuous. It also helps ensure consistent airflow to maintain production, ventilation and dust recovery.

The system provides extensive general filter pulse jet cleaning control modes, such as easily selectable pulsing patterns and a full range of basic timing modes. Modes include continuous, high/low, single cycle and cycle down.

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Delta Launches the New Version of DIAView (V3.7) and Upgrades for Industrial Panel PC DIAVH PPC

Delta announces the update of two products from its portfolio, including version V3.7 of its DIAView SCADA software, which further improves the integration of IIoT applications into existing systems and makes programming even easier.

Delta updates two products from its portfolio and is also adding new Industrial Panel PCs (PPCs) to the DIAVH series that deliver significantly improved performance, featuring 8 GB of RAM as an add-on to the previous 4 GB.

"Delta PPC and DIAView V3.7 are stronger together and the ideal combination of high-performance software and hardware," says Ufuk Özer, Product Manager at Delta. "The two solutions help companies optimize their control and supervision functions for industrial applications and operations based on the collection and analysis of data. This perfectly coordinated team boosts both efficiency and productivity," he adds.

Simpler IIoT integration and push notifications via WhatsApp

DIAView is an established SCADA software solution used by mechanical engineers, system integrators, HMI experts and developers of customized project solutions, among others. Enabling even easier integration with IIoT environments, the new features of version V3.7 really come into their own in industries that require centralized production line monitoring, such as timber processing, food & beverage production and the automotive sector. Besides enhanced scalability and an integrated database, another particular benefit for users is the extensive programmability with less effort. Furthermore, users are now directly informed about critical situations both quickly and simply via a brief notification or an instant messaging application (such as WhatsApp).

Multitasking for various industry applications

The PPC models in Delta's DIAVH series are suitable for a variety of production environments.

These energy-saving, reliable and fanless high-performance embedded industrial computers have a robust case made from a high-density aluminum alloy for effective heat dissipation. They are often used in conjunction with SCADA – by system integrators, for instance, or by developers for special industrial applications. To meet the associated exacting performance requirements, including the simultaneous operation of several production-relevant programs in applications such as rubber production or the manufacture of photovoltaic systems, the

new PPC models boast with 8 GB of RAM. Moreover, customers have a free choice when it comes to the operating system. They can opt for a system that is included in the scope of supply or modify an existing system in line with their particular requirements. In addition, the front panel is certified to protection class IP65 and is therefore protected from dust, oil and other non-corrosive materials.

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The Virtual Twin Experience

What is Digital Twin technology and why is it important for manufacturers

Digital Twin technology has quickly become a staple with many of the largest manufacturers in the automotive and industrial engineering sector around the world thanks to its ability to provide huge amounts of value in saving time and optimizing plant effectiveness. Whilst uptake in smaller manufacturing firms has been slower, those within the sector are slowly starting to see the value that digital twin technology can bring, no matter the size of the business.

What is Digital Twin & Virtual Twin technology?

Digital twin technology allows manufacturers to gain a digital representation of a real-world system – the digital twin mirrors the software or model to gain data and insight that can update.

Digital twin is actually an executable model of a physical system. The physical system can be a factory or a plant or a mine or resource any of them. Which brings in learning and experiences from the physical part, so that you can continuously update your distribution model. The next step up from digital twin is virtual twins, which provide a far more dynamic look factory systems. Virtual twins provide businesses with the ability to visualize models and simulate sophisticated experiences—whereas digital twin solutions are static. Virtual twin essentially shows man-ufacturers exactly what can be executed and implemented in the real world, it's primary focus is to give actionable solutions to improve efficiencies.

In fact, Virtual Twin technology helps us visualize a model not only of the product, but manufacturing and operations as well. When thinking about the capabilities of digital twins, they operate in a closed loop of "ability to ability", but virtual twin goes beyond that. It provides the opportunity where you can control the real world with the virtual world with this closed loop ability and we can bring innovation to expand on that. Virtual Twin solutions can be beneficial for almost any manufacturing organization, both small

and large. It also empowers workforce of the future, and considering current conditions, it's like bringing in new resiliency while people are working in the new or next normal due to this pandemic.

Which Industries Can Benefit from Digital & Virtual Twin?

Digital twins initially found their way into a select few industries where businesses could easily see value and return on investment. The automotive & industrial equipment sectors were the two main areas that invested in digital twin technology initially, along with oil and gas shortly after. These industries had a clear need for the insights provided by digital twins to streamline processes and provide extra efficiency.

In more recent times, manufacturing and life sciences are beginning to really catch up on the benefits that are brought about by digital twins as they're really relying on the twins ability to provide sophisticated models that can be acted upon. In manufacturing and the operations industries, the overall goal for most businesses is to achieve greater profitability in a safe and sustainable way.

The length and breadth of industries that can adopt this type of technology stretches far and wide, and the same can be said about virtual twin technology, as this is essentially a step further than the insights offer by digital twins.

## Why Are Digital/Virtual Twins So Important for Manufacturers?

There are many benefits to having digital or virtual twins integrated into your workflow as a manufacturing business, though the most pertinent are normally time, cost and resource savings, increased levels of safety for all employees.

In recent years, there's been an increased focused on sustainable manufacturing and a 'circular economy', with real emphasis being placed on improving the overall productivity and safety of processes. Alongside this, there's been a real shift in manufacturing bosses looking for more control over production, whilst also minimizing costs. All of this is covered by digital/virtual twins, as they give manufacturers access to important information about cutting costs whilst maintaining, and improving, workflows.

Whilst manufacturing and operations industries are becoming ever more complex due to the digitalization and innovation within each sector, so it's important that things are made as simple as possible. Operation lead times can begin to become longer and longer if inefficiencies in the new workflow aren't ironed out, and that's where digital and vir-

tual twin technology comes in to play. Having the insight and agility to make changes in manufacturing is exceptionally important, especially with the supply chain issues that are currently facing the vast majority of manufacturers around the world.

To really emphasize the effectiveness of virtual twin technology in particular, in one case study, DELMIA saw plant effectiveness increase by 250% after the installation of a virtual twin. The twin provided an in-depth analysis of inefficiencies and provided the manufacturer with simulation models that would help to combat those inefficiencies. Alongside this, employee safety and fulfillment rose by 5% in time savings.
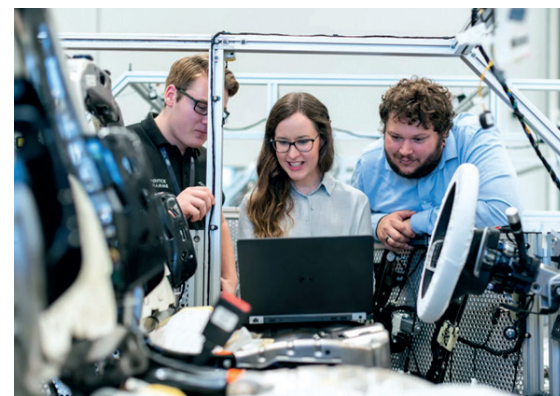
In a separate case study, DELMIA saw another company increase on time deliveries by 50% thanks to better planning techniques and technologies. There was also a 50% reduction in lead times, which enabled the company to maintain high levels of orders, whilst shipping a higher percentage out on time to consumers. This is obviously exceptionally important when you consider how consumers are changing their behavior when it comes to reduced lead and delivery times.

In summary, digital and virtual twins are quickly becoming the staple within many industries thanks to the number of benefits they bring to each company. Manufacturing and logistics in particular can benefit from the technologies, thanks to vastly reduced lead times and help when it comes to planning efficiently.

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FLAT EXTERNAL ROTOR WITH ENCODER
For precise positioning in confined spaces

The DF45 brushless DC motors from **Nanotec** are now available with an integrated encoder. The new flat motors have a diameter of only 45 mm and, owing to their extremely compact design, are ideal for applications that require precise positioning in confined spaces. The 2-channel encoder has a resolution of 1,024 CPR and provides additional Hall signals for commutation. Due to the inductive scanning principle, the encoder is insensitive to magnetic interference and contamination. The difference in length between the standard motor and the encoder version is only 2 mm, as the encoder has been completely integrated. The DF45-E has a rated power of 65 W at a rated speed of 4,840 rpm. In addition to the standard versions, custom windings or shafts are also possible. The short external rotor motors are used in AGV wheel drives, access control systems and door drives. For high-torque applications, Nanotec offers matching high-torque planetary gearboxes.

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24/7 ROBOTIC SYSTEM
Suitable for CNC machine

Tezmaksan's RPA (Robotic Process Automation) system CUBEBOX brings profitability, efficiency and performance. CUBEBOX can help make savings and increase productivity by up to 50 percent in night shifts as it can work 24/7 without an operator. With its compact and ergonomic structure, the device can be positionned wherever the user want. CUBEBOX's pallet changing feature allows the operator to load and unload the magazine "without interrupting the robot working with the machine". The system, which can adapt to every work piece, meets every business-specific needs with its three main and seven sub-models. CUBEBOX is a unique system that can easily define automation processes and use them without the need for program knowledge, thanks to the ROBOCAM program coming with a user-friendly interface. In addition, CUBEBOX uses less resources, energy and labor. Thus, the user both minimizes costs and protects the future of our planet by minimizing their carbon footprint.

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ETHERNET ENCODERS
Lika expands its offering and unveil new products

Lika Electronic widens its range of industrial rotary encoders and is going to unveil a new series of products with Ethernet interfaces. The new encoders offer increased resolutions and all the latest Ethernet technologies available on the market including Profinet, EtherNet/IP, EtherCAT, POWERLINK, MODBUS TCP, as well as the advanced network technology of CC-Link IE. CC-Link IE is an optimal network choice for complete manufacturing control up to the business information system level. It is a vertically integrated and Ethernet-based network from IT layer to field layer with ultra high-speed & ultra large capacity network with real-time performance, that now offers Time Sensitive Networking (TSN) support with CC-Link IE TSN. Thus they are fully ready for futureproof industrial machinery and Industry 4.0 applications. They also integrate the Energy Harvesting Technology to produce electricity and power the multiturn counter. The battery and multiturn gears are eliminated so providing greater compactness, reduced wear, and increased accuracy. The new ultra-compact mechanical design allows them to be installed in the smallest spaces like never before. They come in several mechanical and electrical options such as robust magnetic sensing technology and very high resolution and accuracy optical technology, singleturn and multiturn configuration, solid and blind hollow shafts, and more. The connectors output is axial.

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ICS FOR AUTOMOTIVE MULTI-DISPLAYS
Simplify video transmission

ROHM has developed full-HD (1980×1080 pixels) compatible SerDes ICs optimized for multi-screen vehicle displays. Unlike typical SerDes ICs (serializers and deserializers) that must be connected in pairs for each video transmission, ROHM's new BU18RL82-M deserializer can be daisy-chained to enable video transmission over multiple routes - using just a single serializer. Reducing the number of connectors and cables simplifies the video transmission paths - lowering both system costs and failure risks. The new products are also capable of monitoring whether video data is correctly transmitted end-to-end (from the SoC to the displays) by comparing CRC values. This feature supports functional safety in automotive applications. The new products address these challenges with daisy-chain connectivity and end-to-end data monitoring. Furthermore, the optimized transmission rate, an integrated spread spectrum function and noise peak shifting minimize the power consumption and lower the noise. On top, ROHM's existing SerDes ICs for automotive camera applications of the BU18xMxx-C series, make them an ideal proposal for next-generation vehicle networks.

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HIGH-VOLTAGE MOSFET FAMILY
With an integrated fast body diode

To address contemporary market needs for improved form factors and energy-efficient products, **Infineon Technologies** has developed a new CoolMOS™ PFD7 high-voltage MOSFET family, setting a new benchmark in 950 V superjunction (SJ) technology. The new 950 V series combines excellent performance with state-of-the-art ease of use and features an integrated fast body diode ensuring a robust device and in turn reduced bill-of-material (BOM). The new products are primarily addressing lighting systems, as well as consumer and industrial SMPS applications. The new products are suitable for flyback, PFC, and LLC/LCC designs, including half- or full-bridge configurations making commutation robust and reliable. By integrating an ultra-fast body diode with ultra-low reverse recovery charge (Q rr), they offer hard commutation ruggedness and reliability. This makes it the most robust SJ MOSFET in this voltage class, enabling usage across all topologies in the targeted applications. In addition, significantly reduced switching losses (E OSS, Q OSS, and Q g) improve efficiency in hard- and soft-switching applications and result in up to 4°K lower MOSFET temperature compared to 900 V CoolMOS C3 SJ MOSFET. The new products improve light- and full-load PFC efficiency by more than 0.2 percent while matching the performance with regards to LLC efficiency.

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PLM SOLUTION
Now available on Google Cloud

Siemens Digital Industries Software announced that the Teamcenter® software for Product Lifecycle Management (PLM) is now available on Google Cloud, enabling customers to implement one of the world's most widely used PLM systems more quickly, at lower total cost of ownership, and with the accessibility and scalability that today's forward-thinking manufacturers demand. Teamcenter, from the Siemens Xcelerator portfolio of software and services, is a modern, adaptable PLM system that connects people and processes across functional silos with a digital thread for innovation. Teamcenter helps customers plan, develop and deliver products, while providing secure, controlled access to a company's most sensitive intellectual property throughout the lifecycle of the product, from conceptualization to end of life. When implemented in an Infrastructure as a Service (IaaS) deployment model on Google Cloud, Teamcenter can help improve infrastructure performance, flexibly scale to meet project demands, and lower the total cost of ownership. Additionally, it enables customers to gain those benefits along with the speed, scale, security, and sustainability of Google Cloud. Bringing Siemens' Teamcenter to the cloud enables customers to more easily break down silos to combine the realms of Information Technology (IT) and Operational Technology (OT), enabling the fusion of data from the real world of automation with the digital world of information and engineering technology.
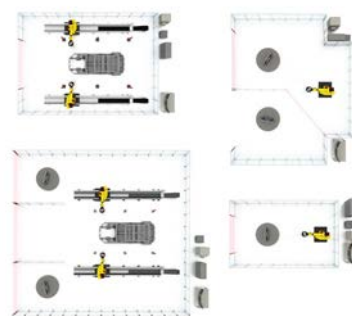
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LASER RADAR STATIONS
Alternative to traditional CMMs

Nikon Industrial Metrology presents an exciting new metrology system for manufacturers seeking to measure the geometry of medium-to-large parts – from a car door, casting or fabrication to a whole car chassis or airframe structure. APDIS Intelligent Quality (IQ) Stations offer a range of Laser Radar solutions as alternatives to traditional, slow, monolithic, inflexible panel machines and large-volume, horizontal-arm CMMs. The use of a predefined set of positions eliminates the requirement for robot programming following installation, even when modifying measurements or adding new parts. Measurement program analysis is achieved with a few simple clicks, enhanced by the ability to define and simulate measurements off-line prior to physical setup. Measurement routines are selected via the inbuilt HMI, so all that's required is to load a part and click a button. Direct feature measurements remove the need for adapters, while small data sets drive faster analysis, speeding up pre- and post-measurement times.

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AMD-BASED INDUSTRIAL MOTHERBOARD
Available in Mini-STX format

Kontron presents the D3724-R mSTX, another addition to its portfolio of high-performance industrial motherboards. Up to four independent displays in 4K resolution can be connected to it. This makes the board in the space-saving mini-STX format particularly suitable for graphics-intensive applications such as casino gaming, digital signage, kiosk, medical displays, thin clients as well as ultra-small industrial PCs. Depending on the computing power requirements, the motherboard, which is developed and manufactured in Germany, is available in three versions. The new D3724-R mSTX industrial motherboard is based on the AMD Ryzen™ Embedded R2000 series processors with integrated AMD Radeon™ Vega graphics and thus offers significantly higher performance than its predecessor R1000 series. It is equipped with up to three DisplayPorts, one HDMI port, one Embedded DisplayPort V1.4 and one dual-channel LVDS (24bit) and drives up to four independent displays in 4K resolution. Other features include USB 2.0, USB 3.2 (Gen1/Gen2) and SATA III, while the M.2 SSD interface (Key-M: 2230/2242/2280) enables the connection of SSD storage devices. AMD's integrated TPM V2.0 ensures a high security standard for Trusted Computing. The newer Windows 11 is used as the operating system alongside the familiar Windows 10 IoT.

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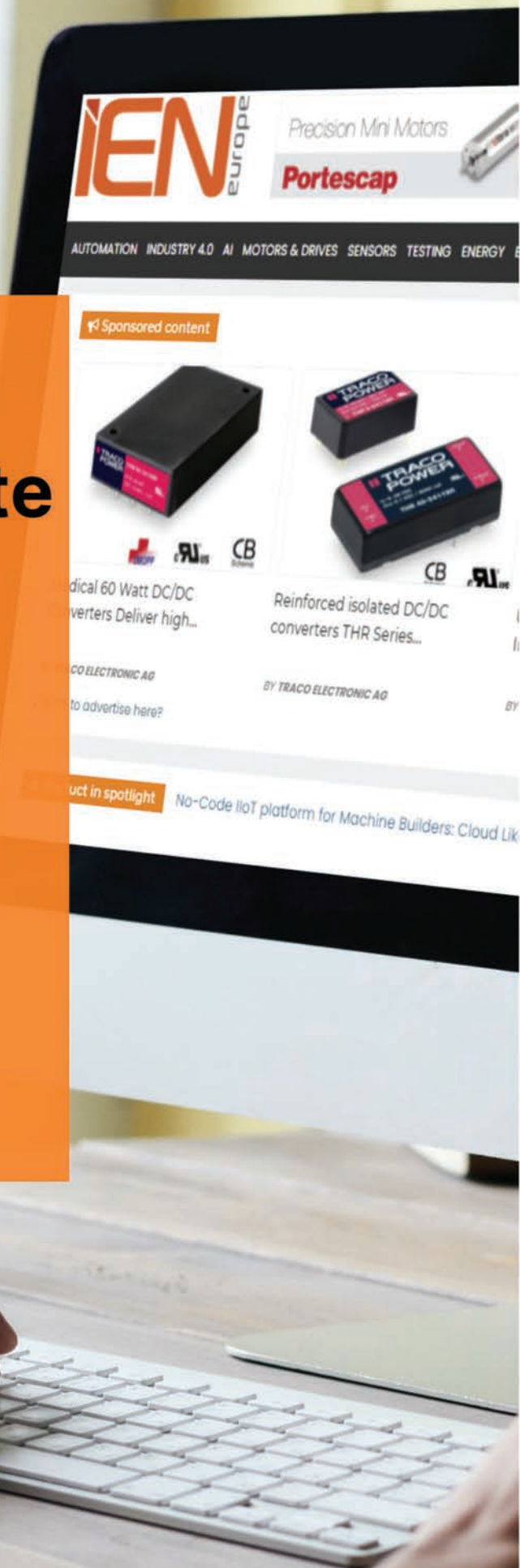
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Manufacturing plants typically lose 30% of compressed air due to pneumatic system leakages. This impacts energy efficiency and environmental sustainability goals. Emerson's Industrial Internet of Things (IIoT) solutions and analytics software provide actionable insights to reduce waste and optimize the energy consumption of your machines.

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