

INDUSTRIAL
ENGINEERING
NEWS

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20 Interview:
The Revolution of
Feedback Systems
with GMI

26 Gearboxes used in CNC
helical rotor and gear
grinding machines

29 Single ecosystem in
network transmission



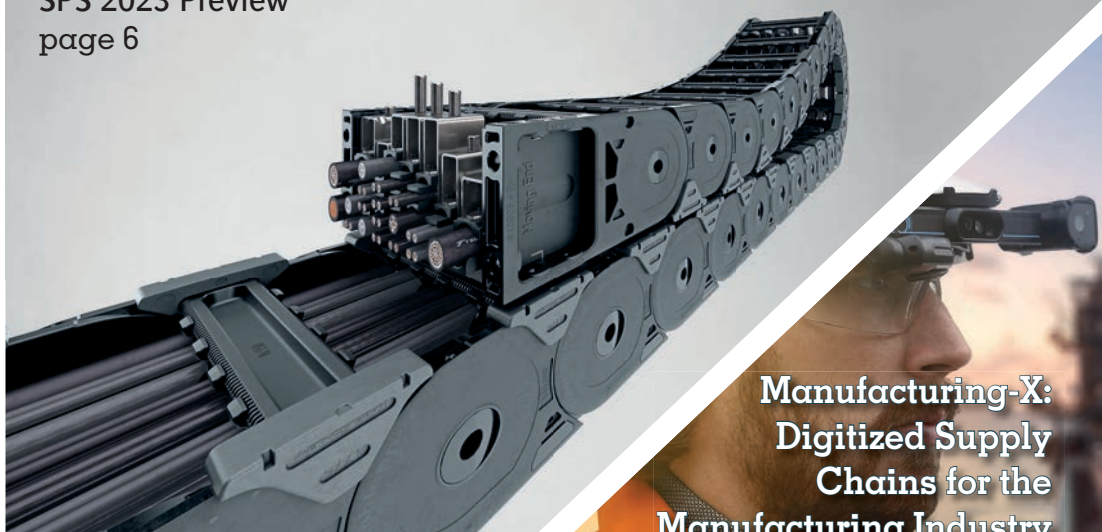
CC-Link IE Time-Sensitive Networking in Action

TSN's journey continues to redefine the landscape of industrial networking, delivering significant business benefits with the combination Time-Sensitive Networking with gigabit bandwidth to create open, converged industrial Ethernet architectures

Supplement



SPS 2023 Preview
page 6



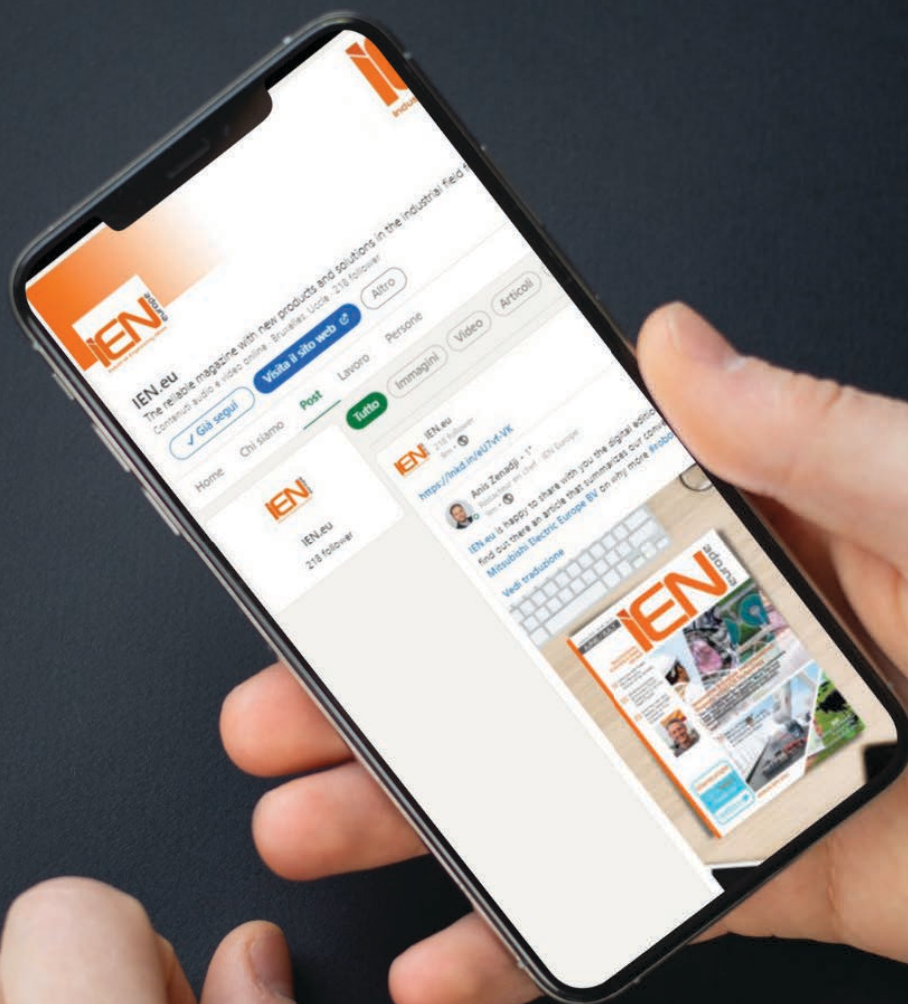
Manufacturing-X:
Digitized Supply
Chains for the
Manufacturing Industry
Page 18

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Dear Readers,

As the industrial world gears up for the 2023 SPS Show in Nuremberg, attendees and exhibitors alike are eagerly awaiting the opportunity to delve into the latest trends and innovations that promise to reshape the future of industrial automation and technology.

One of the standout themes in the run-up to the SPS Show is the relentless push for Industry 4.0. As the fourth industrial revolution unfolds, the integration of artificial intelligence, the Industrial Internet of Things (IIoT), and advanced robotics into manufacturing and production processes has become increasingly pervasive.

What's most exciting is how these technologies are seamlessly converging to revolutionize the way industries operate. Smart factories are no longer a distant dream but are becoming a tangible reality. The SPS Show promises to be a window into this transformative journey, with numerous exhibitors showcasing their cutting-edge solutions that leverage AI, IIoT, and automation to enhance efficiency, productivity, and sustainability.

And when it comes to convergence, don't miss our supplement on Time-Sensitive Networking!

We wish you a pleasant and interesting reading.

Anis Zenadji

Editor for IEN Europe

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N° 11 - NOVEMBER 2023

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In the next issue:

SPECIAL:
Industrial Safety
Packaging
Predictive Maintenance and Analysis
Hardware and Software in Robotics
Mechatronics & Digital Automation

- 5 **Industry News**
- 6 **SPS 2023:** Comprehensive Cable Carrier Portfolio
- 7 Next Generation AC drive Technology
- 10 Bridging Data to Insights
- 12 Next Generation Optical Phased Arrays
- 18 **Special Digital Automation**
Manufacturing-X: Digitized Supply Chains for the Manufacturing Industry
- 20 **Exclusive Interview:** The Revolution of Feedback Systems with GMI
- 26 Product News
- 29 Case Study: Alcatel Submarine Networks (ASN) Delivers its Digital Transformation with PTC solutions
- 30 Index & Events



5



8



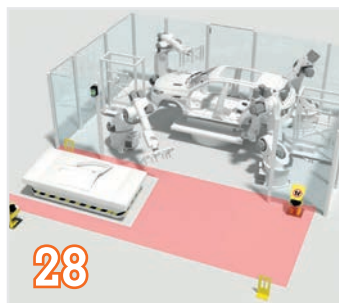
12



18



20



28



Highlights of the ODVA's 2023 Industry Conference: Latest Advancements in Single Pair Ethernet, 5G, Security, Process Automation, TSN, and Data Science

ODVA held its Industry Conference and 22nd Annual Meeting of Members in Europe in El Vendrell, Spain from October 17 - 19, 2023 with over 125 industry professionals from approximately 50 different companies.

ODVA held its Industry Conference and 22nd Annual Meeting of Members in Europe for the first time in El Vendrell, Spain from October 17 - 19, 2023. Over 125 industry professionals from 50 different companies hailing from all around the world were in attendance. Attendees were able to learn from a diverse set of presentations, including developments for Single Pair Ethernet (SPE), 5G, cybersecurity, process automation, TSN, and data science.

ODVA featured two keynote sessions during its 22nd Annual Meeting of Members. The first keynote, from Vincenzo Renda with DIGITALEUROPE, discussed the future of data management, giving insight to manufacturers looking to stay ahead of the latest rules affecting the data to which they are generating and facilitating access, especially in Europe. The second

keynote, from Keith Larson with Endeavor Media, illustrated an important study that ODVA commissioned on the future of SPE that pointed to both a strong market opportunity and a need for industry wide education. Lastly, an update from ODVA's leadership was provided on the recent accomplishments such as the launch of Ethernet-APL, collaborations across process automation, security, and energy management, and the availability of Process Device Profiles, as well as future initiatives for ODVA that will accelerate progress on enhancing EtherNet/IP™.

Additional highlights of ODVA's Industry Conference included a process automation interchangeability demonstration highlighting the workflow and user experience between multiple devices being enabled by process device profiles.

The technical papers and presentations from ODVA's Industry Conference and Annual Meetings can be downloaded at this link: <https://www.odva.org/news-events/industry-conference/library-of-proceedings/>



ODVA Leadership Elected for 23rd Term

ODVA's Board of Directors has top level responsibility for strategic planning and governance and is composed of senior executives from major industrial automation device and system vendors across the globe. In the 23rd term, ODVA's Board of Directors are: Dr. Rolf Birkhofer, managing director of Endress+Hauser Process Solutions for Endress+Hauser; Mr. Jon DeSouza, president and CEO of HARTING Americas for HARTING; Mr. Satoshi Kojima, general manager of network product management group, controller division for OMRON; Mr. Davis Mathews, senior vice president of the Industry Management and Automation at Phoenix Contact USA for Phoenix Contact; Mr. Scott Miller, vice president, Digital & Platform Technologies for Rockwell Automation; Mr. Thomas Petersen, senior director of fieldbus and system integration for Danfoss; Mr. Brian Reynolds, CTO, projects & automation solutions for Honeywell; Mr. André Uhl, vice president of technology and architecture for Schneider Electric.

"ODVA is pleased to have achieved significant advances in TSN conformance test preparation, energy management collaboration, PA-DIM ownership, the launch of Ethernet-APL, and the availability of Process Device Profiles for EtherNet/IP over the course of the 22nd term," said Dr. Al Beydoun, President and Executive Director at ODVA. "ODVA would like to thank the leadership, including the board of directors, the technical review board, and the market advisory committee, for their valuable contributions in making all of the valuable EtherNet/IP enhancements and strategic collaborations possible."

ODVA anticipates that it will announce the dates and location for its 2025 Industry Conference & 23rd Annual Meeting in Q2 2024.



SPS 2023: Tsubaki Kabelschlepp to Present UNIFLEX Advanced 1775: the Standard for Many Applications

Tsubaki Kabelschlepp will be presenting its comprehensive cable carrier portfolio at SPS 2023. Among the exhibits is the popular UNIFLEX Advanced 1775 (UA1775) cable carrier.

The UNIFLEX Advanced 1775 (UA1775) cable carrier has been continuously expanded with new sizes and features in recent months. This qualifies the lightweight, quiet all-rounder for a wide range of applications, including in automotive production, gantries & axes, intralogistics, material flow and material handling, cranes and machine tool manufacturing, the timber industry, agricultural machinery and commercial vehicles.

The UA1775 is available with an inner height of 56 mm and in widths between 100 and 400 mm for the designs 020 (closed frame), 030 (with outside opening and detachable cross-

bars) and 040 (with inside opening and detachable crossbars). The durable cable carrier system impresses with its particularly quiet running and can be used with and without pretension and also unsupported and gliding on long travel lengths. High speeds and accelerations are also possible.

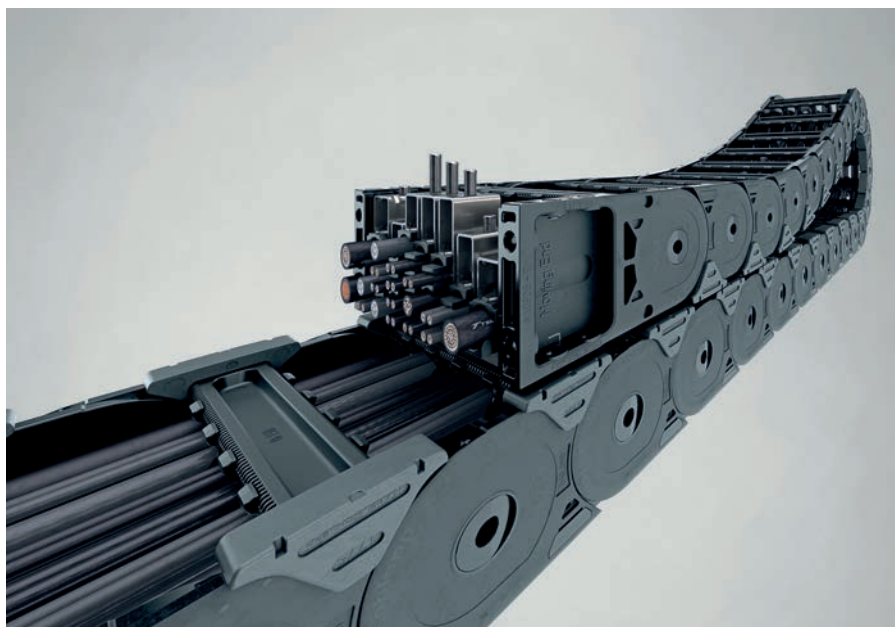
The four-part chain links are designed in such a way that the individual parts require only a minimum of storage volume, simplifying logistics and saving resources. With bending radii between 90 and 340 mm and the short pitch of 77.5 mm, the torsion-resistant design with its sturdy chain body ensures low wear.

To protect the environment, TSUBAKI KABELSCHLEPP manufactures this cable carrier with up to 35 % regrain.

In combination with the latest generation of the space-saving TS3 divider system, this opens up new areas of application, in particular in machine tool manufacturing and for gliding applications on gantries or axes. The TS3 system features a height separation with intermediate plastic partitions, while the narrow end divider on the outer sides ensures space-saving utilization of the space inside the cable carrier. The new divider is used for vertical division within the cable carrier as a standard. The complete divider system can be adjusted in the cross section and can also be used individually as a lockable TS0. The TS1 version with continuous height separation is another variant.

The UA1775 offers fast, easy and simple installation of cables and hoses: The crossbars can be opened and closed quickly – with just two steps in each case. A simple screwdriver is the only tool required. Particularly convenient: The crossbar remains attached to the chain link even when open and can therefore not be lost. If necessary, the crossbar can be released from the chain link with a simple twist.

With the easy-to-assemble design, the cable carrier offers great benefits especially as a ready-to-install TOTALTRAX® system or as an assembly for long travel lengths. In addition to high-flexibility cables, the TSUBAKI KABELSCHLEPP product range also includes guide channels made of aluminum and steel as well as drivers, roof system, condition monitoring components and much more.



The popular UNIFLEX Advanced system from TSUBAKI KABELSCHLEPP was expanded and new features were added. The UA1775 – here as design 040 with high filling space – now makes it possible for the first time within the UNIFLEX Advanced series to use a cable carrier with internally opening stays in a gliding application.

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Sprint Electric Announce Unveiling of Landmark Generis AC Regen Drive at SPS

The Generis AC drive is described by the company as the next generation of AC drive technology, delivering cost effective and highly reliable AC motor control combined with energy regeneration and low input current harmonics.

Generis uses a unique patented switching technology that does not require a DC link. This means Generis gives full four quadrant control as standard, as well as unity power factor and minimal input current distortion. Four quadrant control removes the need for active front end drives or braking resistors, simplifying control of AC motors in complex applications. Removing the DC link in an AC drive also massively reduces harmonic distortion to the mains supply as well as improving drive efficiency. The drive will control all AC motor types with both open loop and closed loop available to maximise its range of application.

Generis drives will be available from February 2024 up to 22kW with additional sizes being introduced over the next three years to cover a range up to 200kW.

Gary Keen, managing director at Sprint Electric, comments:

"Generis boasts simplified mechanics and does not use electrolytic capacitors, so it has no life limiting components which degrade with time and temperature. This results in exceptionally high levels of reliability as well as minimising total cost of ownership."

"Constant torque and variable torque profiles are easily selected so offering full energy efficiency with short payback periods. Generis also includes extended frequency output, a feature often sought in constant power applications."

"This release has been a long time in the making, and the team has worked exceptionally hard to produce this leap in drive technology. Generis represents a new level for AC drive technology," said Gary.

Ideally suited for traditional industries such as converting, metals, print, packaging, presses



and test rigs, Generis has been designed to simplify control without compromising performance. Four easy to use pushbuttons can be used for commissioning with a two-line, 40-character display that entirely negates the need to keep referring to a manual. The simple setup means that Generis can be running within minutes with full autotune capability to maximise motor performance and efficiency. There will be a graphical programming software platform available which will be familiar to customers who are used to using and programming the Sprint DC drive range. This proven software platform will allow the drive to be easily connected in multiple drive networks with advanced application features that

reduce the need for a PLC.

Sprint Electric has manufactured variable speed controllers since 1987, specialising in the control of DC motors. For the past five years they have been partnered with Nottingham University designing the new Generis variable speed drive to control AC motors. Generis will be displayed for the first time on the Sprint Electric stand (Hall 4, 340) at the SPS exhibition, 14-16th November 2023 in Nuremberg. It will also be introduced via a series of technical presentations to be given each day of the show. For more details, please contact Neill Drennan at Sprint Electric Ltd.

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Kontron at SPS 2023: Innovative Complete Solutions

Kontron will showcase integrated Industry 4.0 and IIoT solutions at SPS 2023. The main focus is on the synergy between hardware, software and the supporting system consulting provided by Kontron as a comprehensive solution portfolio.

Kontron, a leading global provider of IoT/Embedded Computer Technology (ECT), will showcase integrated Industry 4.0 and IIoT solutions at the Smart Production Solutions 2023 in Nuremberg from 14 to 16 November. Happening in hall 7, booth 193, the company will shed light on the synergy between hardware, software and the supporting system consulting provided by Kontron as a comprehensive solution portfolio.

Experience IIoT through a live demonstration at the Kontron booth

This year Kontron will be displaying an IIoT network in the form of innovatively networked computer systems. As an example, refrigerators are equipped with sensors to record and monitor key parameters in real time. System monitoring and data acquisition are carried out using secured Arm® and x86 systems with the KontronOS operating system in conjunction with the EquipmentCloud® digitalization solution. This allows easy monitoring of machine conditions, maintenance scheduling, software updates or remote access to machines. As an end-to-end solution, this live demonstration impressively illustrates the integration of hardware, software and competent system consulting offered by Kontron.

Update for the Kontron susietec® KontronOS and Connect IoT bundle

The Kontron susietec® toolset enables companies to implement holistic digitalisation solutions. With KontronOS, a secure industrial IoT-to-cloud operating system based on Linux® for networked systems is provided, which is available as standard on Arm® (AL i.MX8M Mini) and Intel® basis (KBox A-250). It provides protection against compromises and external access to the corporate network as well as uncontrolled updates. The automated update process ensures that the system is always up-to-date. Particularly with large device fleets, it makes sure that all devices in the field are at the same update level despite different schedules and threat scenarios.

Also on show at SPS is the new release of the Connect IoT bundle, which offers an extended range of versatile functions for machine manufacturers and operators. The bundle combines the powerful KBox A-250 industrial computer platform with the low-code interface integration solution FabEagle®Connect. The new version 3.1 integrates data interfaces to the SQL databases Firebird, Microsoft SQL, MySQL, Oracle, PostgreSQL as well as SQLite and simplifies the possibilities



for edge data processing through C# code components. A filterable message monitor facilitates diagnosis during configuration and operation. From the end of 2023, the cost-optimised KBox A-250 will also be optionally delivered with pre-installed FabEagle®Connect to enable a quick start to network installations.

High-performance industrial PCs for Industrial IoT and AI

Kontron will be presenting industrial computers in box PC format and as rackmount or workstation versions with powerful Intel® Core™ i processors of the 13th generation for computation-intensive applications as well as industrial-grade panel PCs and monitors for demanding control and visualization tasks. The product range for the Smart Factory is made complete by Smart technologies as well as scalable solutions and comprehensive services based on Time Sensitive Networking (TSN) and Artificial Intelligence (AI) for intelligent edge computing, convergent networks and workload consolidation.

Performant motherboards offering a high degree of scalability

The compact K3921-N mSTX motherboard, equipped with powerful Intel® Core™ i3 processors and Intel® N-series processors (Alder Lake N), is "Made in Germany" and impresses with outstanding performance in a handy mini-STX format. This versatile board supports up to three independent displays with 4K resolution and is ideal for use in industrial automation, medicine, digital signage, KIOSK, POS/POI and casino gaming. The matching SMARTCASE™ S501 is also available.

High-Performance Computer-on-Modules: Maximum flexibility for edge applications

Kontron offers the latest 13th generation Intel® Core™ Mobile processors on all COM Express® form factors and the high-performance COM-HPC® client modules. Particularly noteworthy here is the COM Express® mini series as an extremely robust and space-saving platform based on Intel® Core™ technology for the first time. An application-ready package consisting of a COM-HPC server module, board management controller and carrier board enables rapid implementation of the final solution. The right module can be selected for the requirements of the individual IIot application from the wide range of COMs in different performance levels and functionality.

Web Panels for industrial applications

Kontron will be expanding its HMI portfolio with a new web panel series based on Arm® NXP i.MX8M Plus processors. These panels are ideal for device and machine visualization as well as facility automation. They come in a range of display sizes (5", 7", 10.1" and 15.6") and provide enhanced graphics performance, PoE capability and advanced connectivity. With the help of the integrated QIWI software toolkit, the configuration and parameterization of the device settings and browser properties are simplified significantly. The panels are ideally suited for use in industrial environments and ensure long-term availability as well as first-class technical support.

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Automating the World



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Analog Devices at SPS 2023

Bridge Data to Insights for a More Sustainable Industrial Future

At SPS 2023 (Smart Production Solutions, Nuremberg, November 14 – 16, 2023), ADI will be demonstrating how the company collaborates with its customers to enable digital transformation, drive innovation, and power the next generation of industrial capabilities. To realize ambitious efficiency, productivity, and sustainability goals, the industrial sector must look to application-level solutions to capture, and act on, operational data. ADI's leading technologies bridge the physical and digital worlds with sensing, connectivity, power, and processing solutions, enabling our customers to transform their data into actionable insights.

Experience ADI's Industrial demos at Hall 5, Booth 110:

- Interactive Industrial Smart Factory Experience:

Virtually tour the digital factory of the future. Explore how factory configurations are changing and the ADI technologies enabling this evolution, including smart connected sensors, adaptive process automation, agile industrial robotics, modular motion control and real-time asset health monitoring.

- Increase Productivity with Modular Mobile Robotics: See how an autonomous mobile robot (AMR) is deployed for optimal control and guidance, while identifying and avoiding obstacles, creating safer working environments through improved sensing. This ADAM (Analog Devices Autonomous Robot) demo showcases a complete AMR solution simplifying design with ADI's modular platforms, including high accuracy depth sensing, motor control of four inde-

pendent wheel drives, intelligent AI processing and mapping, optimized communications, and battery management. This is supported by ROS software drivers for fast time to market.

- Agile Manufacturing with Industrial Robotics: Discover how ADI is addressing three key pillars of robotics - motion control, precision position sensing and perception sensing. Get hands-on with an interactive robotic demo where you are challenged to control the robot and select a prize from a moving conveyor belt. Experience how the world's first single chip absolute multiturn and angle position sensor tracks rotation even when power is lost.
- The Industrial Network of the Future: To fully enable the modern digital factory and realize the productivity gains offered by data and AI, the convergence between the IT and the OT networks must be both seamless and secure. This platform demonstration shows how ADI is empowering factory and process automation systems to leverage the vast quantities of generated data, bridging data to insights for efficiencies at scale. Gather key measurement data and new insights from all corners of the modern factory with ADI's Time Sensitive Networking (TSN), single pair Ethernet, software configurable I/O, IO-Link® and cyber security technologies.
- Energy Efficient Production with Intelligent Motor Drives: Leg isolation is driving the move from traditional fixed speed, grid-connected motors to motors paired with variable-speed drives, for optimum load and torque matching to optimize energy usage. Explore next-generation industrial motor systems featuring AI and sensors for fault detection, diagnosed and displayed in real time.

PRESENTATIONS BY ADI EXPERTS IN THE TECHNICAL CONFERENCE PROGRAM:

ADI's presence at SPS 2023 will be complemented by seven technical expert presentations during the SPS conference:

• TUESDAY, NOVEMBER 14, 2023:

10:10 - 10:30am: Intelligent System Design for Energy-Efficient Drives, presented by Blas Bogado Martinez (Forum Hall 6)

02:10 - 02:30pm: 10BASE-T1L beyond APL – News from the Intelligent Edge, presented by Volker Goller (Forum Hall 6)

12:40 - 01:00pm: Integrated SoC Drives Smart 4-20mA Transmitter, presented by Franco Contadini (Forum Hall 8)

• WEDNESDAY, NOVEMBER 15, 2023:

09:50 - 10:10am: Simplifying the Design and Certification of Functionally Safe Designs by using Certified Converters, presented by Mary McCarthy (Forum Hall 6)

12:00 - 12:20pm: Accelerating Industrial Sustainability through Intelligent Edge Innovation, presented by Fiona Treacy (Forum Hall 8)

02:30 - 02:50pm: The World's First Single Chip Absolute Multiturn Position Sensor, presented by Enda Nicholl (Forum Hall 6)

03:50 - 04:20pm: High Voltage and Noise Robust Solutions in the Industrial Ecosystem enabled by Integrated and Miniaturized Isolation, presented by Maurizio Granato (Forum Hall 6)



Nabtesco at SPS 2023

User-friendly gears with maximum efficiency

Cycloidal gears from Nabtesco are regarded as a key technology for efficient automation solutions. At SPS 2023 the company, with European headquarters in Düsseldorf, will present its broad portfolio of precision products, including user-friendly, flexible and efficient drive concepts for numerous applications.

Cycloidal gears ensure high-precision positioning throughout their entire service life (hysteresis loss of 0.5 to max. 1 arcmin) and are designed for excellent dynamic behaviour, load-bearing capacity (shock resistance up to 500% of the rated torque) and smooth operation. Compared to standard planetary gears, they feature significantly higher precision, dynamics and rigidity, to boost efficiency and reduce costs – whether in mechanical engineering, automated guided vehicles (AGV), medical technology, packaging systems or numerous other applications.

The Neco® series: Innovative plug & play solutions

Especially for automation in mechanical engineering, Nabtesco developed the Neco® (servo gearboxes in a modern, clean design) and Neco®HT (high-torque gears for heavy-duty applications) series. These innovative plug & play gears optimally combine performance, economy and convenience, which makes them the ideal basis for efficient drive concepts. A characteristic feature is their high level of modularity. The combination of standardised elements easily allows the use of



At SPS 2023, Nabtesco will present innovative and economical drive concepts for all applications

gears are specially designed for rotational positioning. Their high positioning accuracy, exceptional performance and compact design make them a feasible alternative to conventional rotary indexers.

numerous defined interfaces for a broad spectrum of drives. This guarantees faster assembly, maximum flexibility in the motor connection, economical series production and high availability with shorter delivery times.

No compromises in performance:

hollow shaft gears of the RD-C and RS series
For routing of cables and hoses, the hollow shaft gears of the RD-C gears are the first choice. The large hollow shaft allows space-saving routing of data and supply lines, as well as drive shafts, while simultaneously increasing the load-bearing capacity. It does not remain rigid, but rather is designed to rotate at the output rpm. The advantage of this is that a sensor on the hollow shaft can determine the position of the drive shaft. The RD-C series comprises servo gearboxes with three different mounting variants: direct, angled and belt driven. This enables fast, economical installation and flexibility of use. The RS

Unrestricted mobility

for automated guided vehicles (AGV)

For mobile automation solutions, Nabtesco offers a fully integrated and decentralised drive unit with a Mecanum wheel that combines utmost precision with maximum robustness, reliability and durability, thus fulfilling all requirements of modern automated guided vehicles (AGV). The RV-W Mecanum wheel drives used by Nabtesco also allow high torque capacity in a compact design and are equipped with an integrated main bearing for optimal absorption of the radial and axial forces generated. Maintenance-free operation of the compact and extremely robust drive concept is ensured thanks to cycloidal gears. The wheel unit houses all necessary components. This gives the user maximum freedom in the design of AGV solutions.

Visit Nabtesco SPS 2023 from November 14–16 in Hall 3A, Booth 426.

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N° 11 - NOVEMBER 2023

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Next Generation Optical Phased Arrays for Improved Servo Feedback

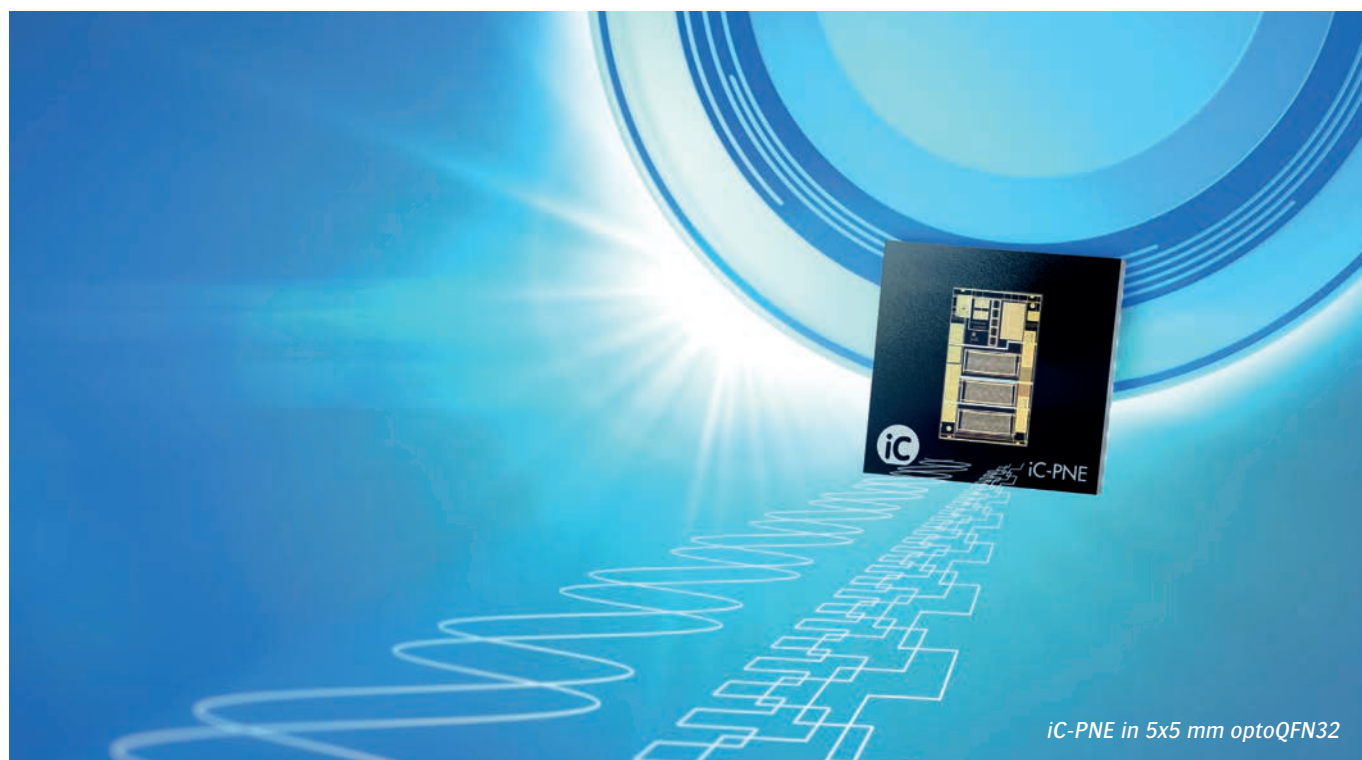
Innovations in the field of high-resolution optical encoders - iC-Haus presents the next generation of the iC-PNE sensor series at the SPS 2023 - smart production solutions (Hall 4A, Booth 146).

Industrial drive controls require very fast and precise feedback of the servo motor rotor angle for the best possible load balancing. This is the area where high-resolution optical encoders come into play, scanning multiple Vernier tracks to achieve excellent resolution. The latest iC-PNE sensor series is blue-ready and can benefit from LED illumination in the near-UV range. It outputs particularly low distortion sinusoidal signals at 2,048 cycles per revolution for virtually latency-free direct feedback to the drive controller. At the same time, the high-contrast signals improve the accuracy of the iC-MNF interpolation circuit, which also performs the Vernier calculation. iC-PNE simplifies this task by adding sector detectors that read a complementary Gray code. This reduces the Vernier scale to angular segments that can be evaluated with a much higher error tolerance for the benefit of operational reliability. Since the sector detectors

operate autonomously from 1.8 V with low power consumption, a battery-supported revolution counter can optionally be implemented via the MCU.

High resolution with minimal installation space

The optical sensors of the iC-PNE series require a small sensor area of only 1.9 mm x 3.3 mm to scan encoder code discs and generate sine signals in best "HiFi quality". The evaluation is performed by interpolation ICs with Vernier calculation, especially the fast S&H converter iC-MNF, which allows extreme angular resolutions of up to 25 bits. Compared to conventional absolute encoder sensors, iC-PNE sensors read three incremental Vernier tracks as well as a 4-bit Gray code, which saves installation space and simplifies illumination. The small sensing area and high sensitivity of the sensors reduce the



iC-PNE in 5x5 mm optoQFN32



energy required for illumination, which benefits the life of the LEDs. The phased arrays can be used with a blue LED, e.g. iC-TL46, which minimizes distortion and increases signal contrast; for devices reading only 512 periods per revolution, the encoders also fit standard IR LEDs (e.g. iC-TL85).

The photocurrent signals are converted into low-impedance and low-noise output voltages by a new low-noise amplifier design. Due to the high transimpedance amplification of typically 1 MOhm, an illumination of 2 mW/cm² is sufficient to provide output signals of several hundred millivolts for the subsequent interpolation module. The iC-PNE devices are available for code disks of 26 mm, 33 mm or 39 mm and operate from 4.1 V over -40 °C to 125 °C. The optoQFN package used is very flat and saves valuable board space with an edge length of only 5 x 5 mm.

Nonius evaluation

Similar to the sliding caliper, whose scale principle was introduced by the French mathematician Pierre Vernier in the 17th century, iC-PNE increases the reading accuracy by means of multiple scales. The absolute position information is contained in the relative phase position of the signals. This requires a special type of evaluation, which the encoder interpolator iC-MNF provides with an interpolation depth of 14 bits.

iC-MNF has a separately adjustable signal conditioning with sample & hold stage for each channel, which holds the conditioned analog signal for subsequent sequential digitization. A high-precision SAR A/D converter with a resolution of up to 14 bits per sine period is available for this purpose. The non-linear A/D converter uses the arctangent function and evaluates sine and cosine simultaneously. For angular position calculation, 2- and 3-track nonius scales are configurable, providing resolutions up to 25 bits (0.04 arc seconds out of 360 degrees).

The converter, which measures only 7x7 mm in the QFN48 package, is protected against reverse polarity and incorrect connection on the cable side and contains the RS422 transceiver for the serial data interface. The output is in SSI or BiSS protocol with clock rates up to 10 MHz. All major chip functions are monitored and can be configured for alarm messages. Typical sensor failures such as signal loss due to wire break, short circuit, contamination or aging are detected and reported to the controller.

A battery-powered multiturn counter as a software solution in the MCU can optionally complete the system. Due to the small form factor and low additional cost, this is a very interesting alternative for modular encoders, e.g. in robotic applications.

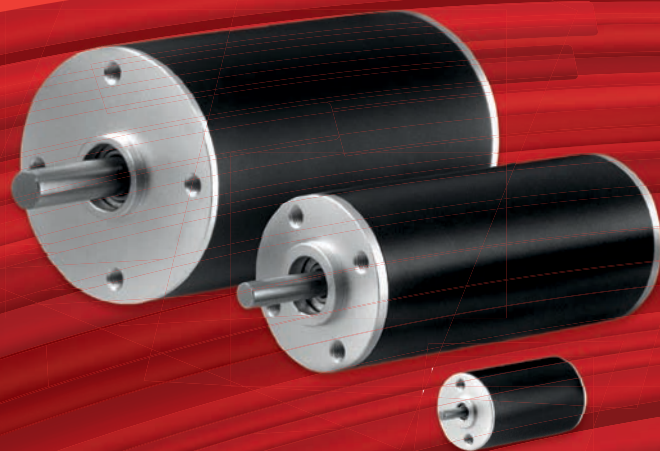
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TE Connectivity to Highlight Connectors and Sensors for Industrial and Warehouse Automation at SPS 2023

TE presents modern solutions around connectivity, battery management, safety sensor technology and Single Pair Ethernet in application-related theme areas

TE Connectivity (TE), a world leader in connectors and sensors, is showcasing a range of new products at this year's SPS in Nuremberg, Germany, in several dedicated theme areas and an "Experience Zone" with a hands-on display of products and sample set-ups. Highlights include enhancements to the Dynamic D1000 Slim range of wire-to-wire connectors and the ECP (Electrically Controlled Contactor with Protection) range of high voltage DC contactors. In addition, a new safety product line will be presented, including safety light curtains, relays and accessories.

Theme areas cover industrial automation, drive and control technology, robotics and warehouse automation, and Single Pair Ethernet (SPE). Visitors will gain specific insights into TE's latest product highlights and technologies. In addition, the SPE Industrial Partner Network will also be presented in a separate zone together with TE.

New ideas for industrial automation

For applications in industrial automation and for the fields of robotics, automated guided vehicles (AGVs) and servo motors, TE introduces the D1000 Slim connector to the extended Dynamic series of connectors. The small wire-to-wire connector is 80% smaller than products in the existing D1200 series. Its slim design is suitable for space-constraint small industrial equipment and machinery, while reducing the risk of interference. The coding and locking function help to ensure reliability. This reduces the risk of unlocking and connector breakage, for example in tight robot arms. As the user can hear if the locking is correct when mating, the reliability of the connection is increased. The simple



ECP series of high-voltage DC contactors

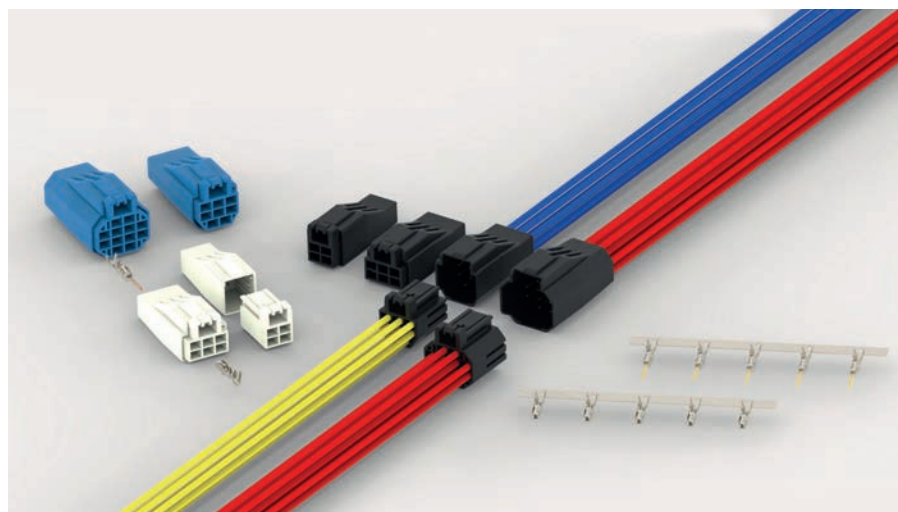
mating and crimping process reduces installation time.

Battery storage and EV charging solutions

New Energy, including Battery Energy Storage Systems (BESS) and electric vehicle charging infrastructure, has

its own section. Current product highlights include the ECP series of high-voltage DC contactors, which are used in battery storage systems, solar inverters and in charging stations for electric vehicles and AGVs (Automated Guided Vehicles) in warehouse automation. They meet the requirements of IEC 60947-4-1 and feature bi-directional load switching, a switching capacity of 1500 VDC at 1000 A and a continuous current carrying capacity of 500 A. Auxiliary contacts and a hermetic ceramic seal provide reliability and safety.

For power electronics and battery management systems, TE also offers the new VolTron 1000 high-voltage connector in 2, 5, and 6 pin versions. With an operating current of 0.5 A, the connector covers a voltage range of up to 1,000 V and complies with the LV215 standard for high-voltage connectors, due to its dielectric strength (rated surge voltage up to 2,500 V). The 6.2 mm pitch connector can be used in virtually any application where high voltage needs to be constantly monitored.



TE's new D1000 Slim connector for tight spaces

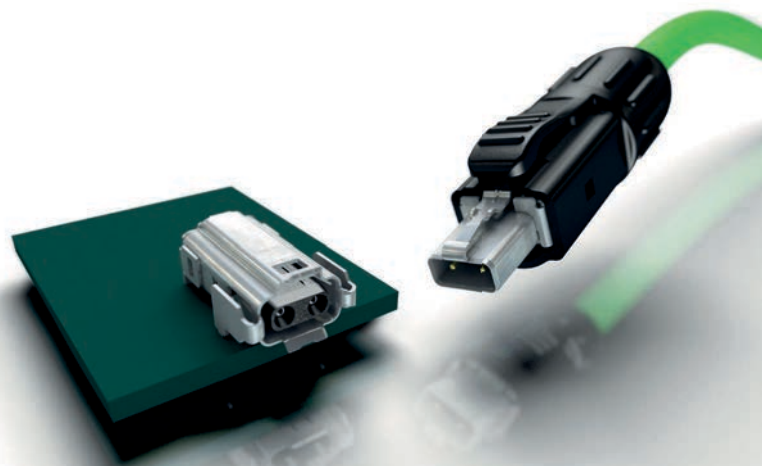
New safety product line

TE introduces a safety product line for robotics,





Safety Line with SLC safety light curtains and SRS safety relays systems



SPE T1 connectors from TE (IP20)

warehouse automation and industrial machinery that includes compact Type 2 and Type 4 SLC safety light curtains in accordance with EN IEC 61496-1/-2 standards. These IP67 safety sensors with a resolution of up to 14 mm for hand and finger protection increase safety at access points to hazardous areas. The product range covers protective field lengths from 160 mm to 2250 mm in various ranges (protective field widths) as well as different resolutions and 2-, 3-, or 4-beam versions for access guarding. Besides light curtains with integrated safety functions, including self-monitoring of static outputs, control of external contactors (EDM) and selectable automatic/manual restart, TE also offers safety relay systems (SRS) for interfacing to the machine control system.

Connectivity with new SPE connector solutions

In the SPE area, TE showcases its latest products that support SPE for IIoT infrastructures.

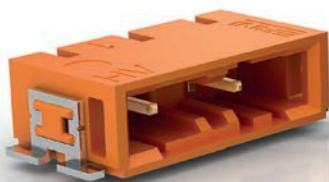
This offers OEMs new opportunities to miniaturize their devices with improved energy efficiency. In TE's IP20-rated SPE T1 connectors, data and Power over Data Line (PoDL) are transmitted over two copper wires instead of two or four wire pairs as in Gigabit Ethernet. TE's SPE solutions also include an M8 hybrid jack for boards and an M8 SPE hybrid interconnect, both with IP67 protection. The maximum data rate is 1 Gbit/s, and the power supply is up to 400 W. The first samples of M12 hybrid connectors according to IEC 63171-7 for applications with power classes from 8 A to 16 A and from 50 V to 600 V are also being presented. TE's M12 connectors can be used to implement a future-ready, largely barrier-free system from the sensor to the cloud and virtually seamless M2M communication.

Worth a visit in hall 10 at booth 340

Whether SPS visitors are interested in sensors and PLCs, upgrading to an SPE infra-

structure, or simply looking for a solution to an automation problem, the TE team looks forward meeting them in hall 10, booth 340. More information about TE's presence at the show and SPS highlights can be found at www.te.com/SPS

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TE's VolTron 1000 high-voltage connector



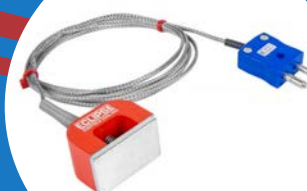
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Schmersal's IIoT Demonstrator at SPS 2023

Innovations and hands-on examples of the implementation of the Industrial Internet of Things

At SPS – Smart Production Solutions – 2023, the Schmersal Group will demonstrate how the Industrial Internet of Things (IIoT) can be implemented at field level by showcasing a range of new developments in automation technology and machine safety. The innovative components and systems from Schmersal enable a comprehensive machine communication and a holistic integration ranging from the field level all the way to the cloud.

To make this evident, Schmersal will be exhibiting an IIoT demonstrator in hall 9, stand 460: The demonstrator features a conveyor belt with two compact 3D ToF cameras installed above it. The IIoT demonstrator from Schmersal is used to illustrate how the data and information collected by the cameras, the

PROTECT-PSC1 safety controller and a PLC, can be forwarded to an edge gateway via OPC UA and, if needed, to a cloud infrastructure – for instance, as a starting point in determining production-related key performance indicators.

Novelty at SPS: AM-T100 ToF camera

An integral part of the IIoT demonstrator is the AM-T100 3D camera, which Schmersal presented for the first time at the beginning of this year. Here, the integrated Sony DepthSense™ sensor uses time-of-flight (ToF) technology, i.e. runtime measurement of emitted light pulses in the infrared range (850 nm), that are reflected by the objects being captured. This allows for creating a 3D image of the scene at high

speed that is accurate to the millimetre and that is available as a point cloud. In this way, the camera can determine the position and the dimensions of an object or detect the fill level of a container, for example.

High-performance fault diagnosis

Schmersal will also present a new gateway for the acquisition of diagnostic data at the SPS, which is equipped with a web server and a microSD memory card. This allows users to analyse event logs live via the web interface and read out the entire diagnostic data from all connected safety switches in plain text in the browser. The diagnostic data can be transmitted to the machine controller via various fieldbus protocols. The new SDG fieldbus gateway will be of particular benefit to users in terms of high performance fault diagnosis.

Safety Fieldbox – now also compatible with EtherNet/IP CIP Safety and EtherCAT/FSOE

On the safety-related level, the successfully introduced Safety Fieldbox ensures uncomplicated data transfer to a safety controller through its simple and fail-safe connection of up to eight safety switching devices of different types. At SPS, Schmersal will be showcasing two new variants of the product: As of now, the box can not only be integrated into systems with PROFINET/PROFIsafe as before, but will also be available for the EtherNet/IP with CIP Safety and EtherCAT with FSOE bus systems.

Visit Schmersal at SPS – Smart Production Solutions – in Nuremberg, hall 9, stand 460, between 14 and 16 November 2023.



The new AM-T100 3D camera: an integral part of the IIoT demonstrator used by Schmersal in hall 9, stand 460 to showcase the implementation of the Industrial Internet of Things (IIoT).

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SPS 2023!

CC-Link IE TSN in Action

CC-Link IE TSN

Photo credit: KELLER Poligrafia dla przemysłu/Oyster Studios

Time-Sensitive Networking
for Industry:
A Technology in Action

page 2

CC-Link IE TSN Delivers
Significant Productivity Benefits
to Additive Manufacturing

page 5

CC-Link IE TSN Sets
Tomorrow's Battery Industry
in Motion

page 7

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Time-Sensitive Networking for Industry: A Technology in Action

Following two supplements published in IEN Europe in the April 2022 and April 2023 issues, we continue the journey through this all-in-one network with a new collaboration with the CLPA. CC-Link IE TSN combines Time-Sensitive Networking with gigabit bandwidth to create open, converged industrial Ethernet architectures that deliver significant business benefits. And with software-based implementation, CC-Link IE TSN enables easy product development and faster time to market.

This introduction paves the way to four different case studies of players using TSN, including Keller, Shashin Kagaku (3D printing), Orisol (footwear manufacturing), and an anonymous Chinese battery manufacturer. In today's industrial landscape, the relentless pursuit of efficiency, safety, and precision has reached unprecedented heights. Industries such as manufacturing, energy, automotive, healthcare, and telecommunications demand instantaneous and dependable communication for critical processes. To meet these stringent requirements, Time-Sensitive Networking (TSN) has emerged as a game-changing technology, poised to transform the way industries handle real-time data and applications.

The Essence of Time-Sensitive Networking (TSN)

Time-Sensitive Networking, or TSN, is a unique, real network technology that is used on concrete applications. It is a suite of standards and technologies meticulously engineered to enhance Ethernet networks' capabilities in catering to time-critical applications. It marks a pivotal evolution from conventional Ethernet, which was primarily designed for non-deterministic, best-effort communication and struggled to meet the exacting demands of modern industries. As a

technology in action, TSN provides the foundation of a converged network while before this, we used to utilize one network for each part such as safety, motion control, or IO. The combination of all networks into one finally leads to a faster time-to-market.

Necessity Breeds Innovation

Industries across the spectrum rely heavily on instantaneous and deterministic communication to ensure smooth operations, safety, and optimal resource utilization. TSN has arisen in response to this pressing need and offers several key attributes:

1. *Deterministic Precision:*

TSN empowers networks to deliver data packets with pinpoint precision, ensuring predictable and bounded latency. This determinism is fundamental for synchronizing and orchestrating complex industrial processes.

2. *Bandwidth Assurance:*

Through advanced mechanisms like time-aware shapers and scheduled traffic, TSN enables the reservation of network bandwidth for mission-critical data streams. This guarantees that crucial data gets priority, preventing congestion and ensuring timely delivery.

3. *Seamless Integration:*

One of TSN's strengths lies in its ability to seamlessly integrate with existing Ethernet infrastructure, making it a cost-effective solution for upgrading legacy systems. This facilitates a smooth transition towards real-time capabilities without disrupting ongoing operations.

4. *Interoperability:*

TSN operates on open and standardized protocols, fostering interoperability among equipment from different vendors. This liberates industries from vendor lock-in, allowing them to choose the most suitable solutions for their specific needs.

5. *Reliability and Resilience:*

TSN incorporates redundancy and fault tolerance features, ensuring network resilience even in the face of hardware failures or network hiccups. This robustness is crucial for industries where downtime can be financially and operationally catastrophic.

Conclusion

Time-Sensitive Networking represents a seismic shift in how industries approach real-time communication, addressing the unique challenges faced by diverse sectors. As industries embrace TSN's deterministic precision, bandwidth assurance, and interoperability, they open the doors to a future characterized by unparalleled efficiency, safety, and innovation. TSN's journey continues to redefine the landscape of industrial networking, promising a future where industries thrive on the bedrock of instant, reliable, and deterministic communication.

The adoption of Time-Sensitive Networking transcends industry boundaries and encompasses a myriad of applications. In industrial automation and control systems, TSN facilitates precise control of machinery and robots, driving efficiency and safety in manufacturing processes. TSN plays a pivotal role in managing smart grids, ensuring the stability and resilience of power distribution networks. The automotive industry harnesses TSN for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication, paving the way for autonomous vehicles. In telemedicine and medical imaging, TSN guarantees the timely and secure transmission of critical medical data, improving patient care and diagnosis. TSN empowers telecom networks to manage high-speed data traffic and low-latency communication, enabling the seamless operation of next-generation services.

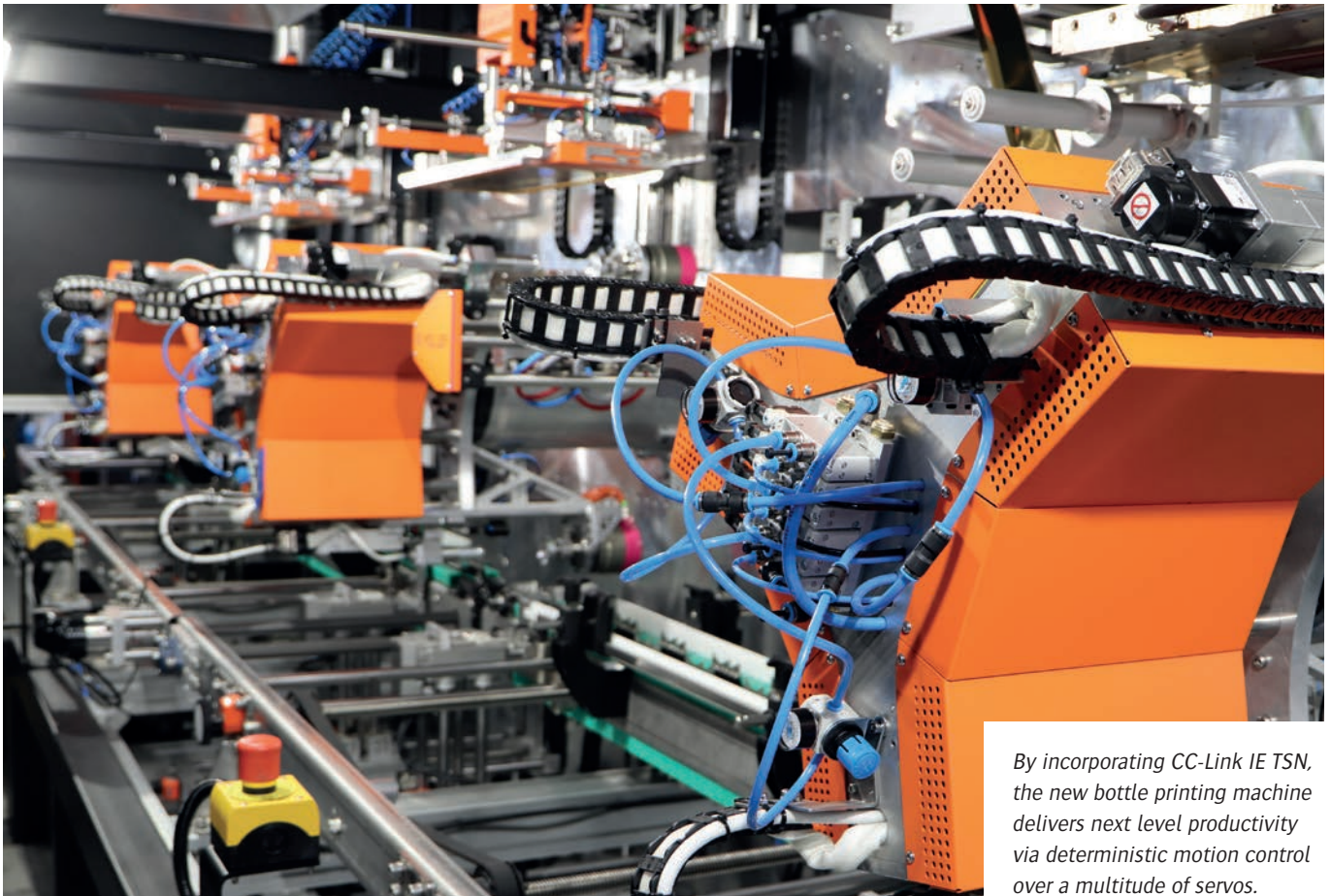


Photo credit: KELLER Poligrafia dla przemysłu

By incorporating CC-Link IE TSN, the new bottle printing machine delivers next level productivity via deterministic motion control over a multitude of servos.

CC-Link IE TSN Drives Innovation in Keller's Industrial Printing Technologies

Keller, a leading OEM of machines that perform screen and pad printing as well as hot stamping based in Poland, has developed an innovative new system that leverages CC-Link IE TSN network technology to boost productivity. By incorporating Time-Sensitive Networking (TSN), the new bottle printing machine delivers next level productivity via deterministic motion control over a multitude of servos. This has resulted in significant improvements in terms of performance, accuracy and precision.

Printing and stamping are among the most demanding motion control applications, as they use multiple axes that need high levels of synchronisation to operate effectively at extraordinary speed with high repeatability. When looking at their communications requirements, these functions need to be supported by highly deterministic, real-time communications across multiple axes. At the same time, end users are demanding ever-more high-speed, advanced machines, meaning that implementing a

network technology that can achieve this is key. TSN is the technology that can address these requirements today, while also offering further benefits for the future. These include the possibility of using a converged network architecture to simplify machine design, reduce costs and decrease time to market. This is enabled by multiple kinds of traffic being combined together, rather than using separate networks as in the past. When Keller wanted to develop a universal, modular machine for direct, multi-

colour printing on cylindrical goods, such as bottles, it turned to its longstanding partner, and board member of the CC-Link Partner Association (CLPA), Mitsubishi Electric. The team at the heart of the collaboration set out to identify the most suitable options from which it could create the best machine to support Keller's ambitions and the needs of its customers.

Tomasz Andrzejewski, Head of Automation Department at Keller, explains: "We started cooperating with Mitsubishi Electric in 2012. Since then, we have been able to appreciate and experience first-hand the abilities of Mitsubishi Electric's solutions, including its latest generation of servos. These are incredibly reliable and meet our strict precision requirements."

Taking the right turn

The unique setup developed by the companies, which combines screen printing and hot stamping on cylindrical objects, utilises an industrial automation system that incorpo-

rates CC-Link IE TSN network technology to offer ground-breaking performance. This includes MELSERVO MR-J5 servos controlled by MELSEC iQ-R series PLC.

As a key supporter of CC-Link IE TSN, Mitsubishi Electric used the network's industry leading combination of TSN and gigabit bandwidth to offer Keller a system that could provide fully deterministic control of up to 128 axes. It also enabled extreme synchronisation accuracy in the order of microseconds. This ensures that the machine can deliver prints of consistently high quality while maintaining a rate of 3,000 units per hour, with a plan to reach 3,600.

Michał Cydzik, Product Manager for Control Systems at Mitsubishi Electric, adds: "What Keller wanted was a really advanced and ambitious setup, with 20 axes per colour head and a total of 65 MR-J5 drives, in addition to 18 auxiliary virtual axes. CC-Link IE TSN provided the necessary determinism, capacity and bandwidth required to handle this while delivering the performance Keller needed."

Opening the door to future-oriented manufacturing

The resulting machine offers end users a modular, versatile solution that delivers enhanced productivity, cost-effectiveness, flexibility and high print quality. Moreover, the setup is scalable, as it can incorporate up to 8 different colours (and their necessary axes) and is completely reconfigurable. It can be extended to include additional printing modules to deliver a highly integrated system. The final result was an industry leading machine which was enabled by an equally industry leading open industrial Ethernet technology.

John Browett, General Manager at CLPA Europe, comments: "Keller is an excellent example of how CC-Link IE TSN can drive next-level performance and capabilities in key industries. Market acceptance continues to grow and there are currently a wide variety of industries and applications where it is in use. This attests to the strength of our latest technology and its increasing global importance."



Keller identified the convergent network architecture benefits offered by CC-Link IE TSN and plan to add additional machine functions, like vision systems, on the same network architecture.

CC-Link IE TSN Delivers Significant Productivity Benefits to Additive Manufacturing

Additive manufacturing (AM), or “3D printing”, has quickly opened up new production frontiers. For instance, the original delicate parts formed by earlier AM technologies, suitable only for prototyping and laboratories, have now given way to methods that provide actual production parts. While material science has led the way in these advances, high precision motion control and the ability to combine this with all other machine functions has delivered significant competitive advantage for one AM machine manufacturer by adopting CC-Link IE TSN. Now that AM has moved out of the prototyping lab and into mainstream production lines, it has become subject to all the same pressures as its subtractive manufacturing cousin. As a result, manufacturers of AM systems have been under pressure to produce machines that continue to raise the bar on customer expectations as market forces intensify.

Shashin Kagaku is a Japanese manufacturer of AM systems that form high precision parts using a ceramics-based process. Their new SZ-6000 system uses an alumina or aluminium oxide powder mixed with a resin to form a slurry that is cured under UV light. This is then used to build up parts layer by layer by using UV light to cure the photosensitive slurry into the required form. Finally, a kiln fires the parts, evaporating the resin and making them durable enough for real applications via sintering of the ceramic powder.

The SZ-6000 can manufacture relatively large-scale parts, with dimensions exceeding 600 mm square and 300 mm deep, while maintaining manufacturing tolerances on the scale of thousandths of millimetres. To do this, extremely fine motion control of a variety of rotary and linear axes in an interpolated man-



Photo credit: Shashin Kagaku

ner is required. These also need to operate at high speed to meet the necessary productivity targets. Of course, the complete machine architecture extends beyond just the motion control aspects. Tight control of the UV digital light processing (DLP) exposure system must be closely coupled with the motion axes, while also integrating all other machine functions. To meet these demanding requirements, Shashin Kagaku turned to CC-Link IE TSN to combine gigabit bandwidth with Time-Sensitive Networking (TSN). In this application, the use of TSN technology permits disparate types of network traffic to share a single network architecture by employing IEC/IEEE standards, such as 802.1AS and Qbv. These synchronise traffic flow across the network and regulate the priority of different traffic types. By leveraging TSN along with the industry leading gigabit bandwidth of CC-Link IE TSN, Shashin Kagaku were able to realise a number of key benefits. The convergence of different network traffic on the same architecture allowed the complex, multi axis, high precision motion control sys-

The new SZ-6000 is an extremely productive additive manufacturing (AM) machine that provided Shashin Kagaku a significant lead over its competition while offering customers a significant increase in productivity

tem to be run on the same network as the rest of the system I/O. This, in turn, delivered the tight integration between the motion control systems and the operation of the UV DLP exposure system. The maximum number of axes that could be handled by this system was up to 128, providing scope for even more advanced systems in the future.

Consequently, the construction of the machine could also be simplified, as less

wiring was required to construct the internal systems, leading to reduced construction time. As a result, Shashin Kagaku could offer shorter delivery times, reduced system cost and a more competitive product.

The gigabit bandwidth of the network contributed to a component production time that is about ten times faster than Shashin Kagaku's existing systems. More precisely, a minimum motion loop closure time of 125 microseconds could be achieved, allowing the company to offer a step change in productivity.

TSN's ability to converge OT and IT traffic also provided an interface to external CAD systems in order to download designs, which can be converted into the motion programs, which control part forming.

John Browett, General Manager of CLPA Europe, commented: "We have known all along that CC-Link IE TSN was capable of delivering significant productivity benefits to end users and machine builders alike. This advanced additive manufacturing system from Shashin Kagaku shows just how."

CC-Link IE TSN Revolutionises Footwear Manufacturing

When Orisol, a leading provider of automated systems for footwear production, wanted to futureproof its offering to drive its customers' and its own competitiveness, CC-Link IE TSN offered the ideal technology. The resulting innovation delivers unprecedented speed and responsiveness as well as the connectivity required for smart manufacturing operations. Orisol is committed to delivering solutions that maximise interoperability, compatibility and scalability to support the digital transformation of its customers and advance their competitiveness.

In line with this aim, Orisol participates in key collaborations, such as Mitsubishi Electric's smart manufacturing initiative, the e-F@ctory Alliance. In addition, it focuses on the development of future-oriented systems that can support the different stages of shoemaking.

Here, TSN can provide the backbone for smart, data-driven operations by supporting the convergence of multiple types of traffic onto a single network. While doing this, TSN also ensures determinism by prioritising the transfer of time-critical messages, such as control data.

Innovation – body and soles

Orisol saw its OFA240 series upper to sole flash activator machine as an ideal candidate to benefit from the principles of TSN technology. This system, which is a key element of footwear assembly lines, uses heat activation to effectively and homogeneously cure adhesives that are applied to bond different shoe components together.

Successful bonding requires accurate and precise control of the heat applied onto the product. In effect, the challenge in this process is the heat energy distribution that is spread out



Photo credit: Orisol

on the surfaces. It requires the machine to have precise internal communications to regulate the heating energy being released. Also, it needs to offer monitoring functions for the user to know if intervention is needed.

In terms of network requirements, optimum operations for the OFA240 demand suitable controller to device (C2D) communications, so that a single network architecture could be used for all the operational technology (OT) elements of the machine to self-adjust in real-time. These components include vision systems, temperature sensors, heat lamps, switches, indicators and alarms.

Moreover, since Orisol is focused on the digitalisation of operations to create a smart facility, a network architecture that could also enable controller to controller (C2C) communications, in addition to integration with higher level information technology (IT) systems, was required. This would allow machines to operate in parallel to share information and effectively collaborate to optimise product quality, efficiency and productivity. TSN also offered the possibility for multiple machines to be integrated into Orisol's

When Orisol, a leading provider of automated systems for footwear production, wanted to futureproof its offering, CC-Link IE TSN offered the ideal technology.

proprietary production monitoring and remote maintenance systems, such as its Production Data Collection System (PDCS) and Remote Operation Maintenance Platform (ROMP).

A foot in the door

The network's gigabit bandwidth led to internal communications speed increasing 220 times. This meant that execution time was shortened by 7 times and application time by 12 times. CC-Link IE TSN also enabled machines to be synchronised to an accuracy of 1 millisecond. This delivered almost instant data sharing, delivering precise communications within the machine itself, to other devices and to IT systems, such as Orisol's PDCS and ROMPS. These provide remote monitoring and control, allowing operators to have a real-time overview of the process as well as promptly intervene, if anomalies are discovered. The end result was a system that fully addresses the demands of Industry 4.0 by using TSN technology.

John Browett, General Manager at CLPA Europe, concludes: "Orisol's OFA240 series flash activator machine is an excellent example of how TSN has been applied in a real-world application to deliver significant machine performance improvements. We look forward to seeing many more companies apply CC-Link IE TSN the near future to realise similar benefits for their own machines and customers."

CC-Link IE TSN Sets Tomorrow's Battery Industry in Motion

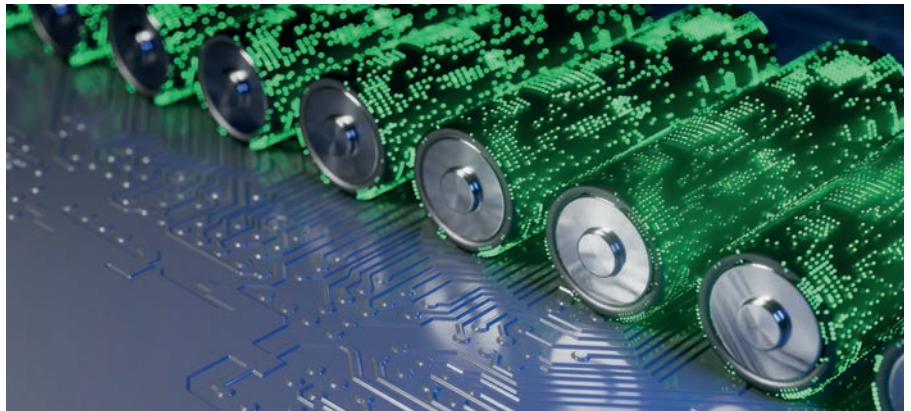
Leveraging the right network technology can help lithium-ion battery (LiB) manufacturers get the most from exciting market opportunities by meeting challenging market demands. CC-Link IE TSN network technology helped a premier LiB company simplify its manufacturing systems while complying with exacting product specifications.

To accommodate rising global demands, LiB producers need to quickly scale up their capacity while delivering high-quality products. This requires high precision, high-yield, high-throughput manufacturing systems.

LiB manufacturing is a complex, multistage process, of which the majority are based on established converting principles. An electrolyte slurry is mixed and then applied to a metal foil as a fine layer, which is dried before passing through an intricate series of slitting, winding and cutting activities to manufacture the finished cell. These require an exacting, highly coordinated series of multi-axis motion control operations to deliver the required quality and avoid waste. The performance of the finished cell in terms of capacity, internal resistance and reliability is highly dependent on multiple parameters, such as coating uniformity, film tension and so on. Moreover, since the demand for lithium and other raw materials continues to grow exponentially, it is clear that material wastage caused by out of spec product should also be kept to an absolute minimum.

To further increase the application challenges, as battery manufacturers seek to constantly increase cell capacity, foils and their coatings are constantly getting thinner. While striving to achieve this, materials need to be handled at higher and higher speeds to meet production targets driven by insatiable market demands.

Finally, besides the critical motion control processes, a variety of associated machine functions need to be integrated into the production process to provide the required functionality.



CC-Link IE TSN converges motion control with safety and general I/O control traffic to deliver high performance operations.

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These include visual coating inspection, film tension, tab welding, general machine control and safety systems.

Key to addressing these challenges is an open industrial Ethernet technology that delivers high performance along with network convergence. This allows productivity and performance targets to be met, while simplifying machine designs by combining multiple traffic types onto a single network architecture.

Delivering TSN's benefits to LiB manufacturing

When a leading producer of automated LiB manufacturing lines was looking for a new technology that would improve the productivity of its systems, while simplifying their designs and reducing time to market, CC-Link IE TSN stood out. Among CC-Link IE TSN benefits to machine builders, the gigabit bandwidth meant that large volumes of production data could be handled easily, without affecting machine performance or plant productivity. Moreover, since data is shared at gigabit speeds, the setup could offer a scalable solution that can continue to meet the increasingly more demanding needs of LiB manufacturers. Finally, operation at these speeds meant that multiple motion axes could

be synchronised on microsecond intervals, providing a degree of process quality not previously possible.

Additionally, the integration of TSN into the network meant that several different traffic types could also be combined onto a single network architecture. This meant that the large and complex multi-axis motion control system of the company's machines did not have to suffer from the cost penalty of having to use multiple networks to handle motion control separately from other machine functions such as visual inspection, safety and general machine control.

The final benefit is that TSN's ability to allow different traffic types to share the same network also provides the foundation for OT/IT convergence.

John Browett, General Manager of CLPA Europe, commented: "This leading producer of automated LiB manufacturing lines using CC-Link IE TSN is leveraging our technology to take a leap forward over their competition and provide an industry leading, scalable platform for their customers now and in the future. We are confident that CC-Link IE TSN will continue to deliver benefits to the LiB industry and many other sectors as we move forward."

ONE

CC-LINK IE TSN: ONE NETWORK. ONE SOLUTION.

Combine Time-Sensitive Networking with gigabit bandwidth to create open, converged industrial Ethernet architectures that deliver significant business benefits. And with software based implementation, CC-Link IE TSN enables easy product development and faster time to market.

- **Simpler network architectures/machine designs**
- **Greater process transparency and better management**
- **Better integration of OT and IT systems**
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OPEN AUTOMATION NETWORKS

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BRUSHLESS SLOTLESS MOTOR

With great torque and speed capabilities



The 40ECP brushless motor with slotless design from **Portescap** allows the motor to run up to 30,000 rpm, while its low weight of 230 grams and compact 40mm diameter not only facilitates continued application miniaturization, but also supports improved tool ergonomics. The integrated fan

provides active cooling during the motor's operation, which improves operator productivity. The special electromagnetic design provides high speeds at low voltage while simultaneously delivering excellent peak torque capability; in fact, the 40ECP motor can sustain peak torque for 2 seconds up to 1.1Nm. The 4-pole motor is compatible with the R32 gearhead and the M-Sense encoder, allowing for higher torque at lower speeds and more accurate positioning. As with its entire product portfolio, Portescap offers the flexibility to customize the motor's electrical parameters and mechanical interface to meet specific application requirements. Battery-powered hand tools will benefit from the 40ECP, such as strapping/stapling, riveting, tightening, crimping, and cutting hand tools. Other applications, including miniature pumps, electric grippers, and robotic actuators, are also well-suited for leveraging the 40ECP.

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HIGH-POWER PROCESS APPLICATIONS DRIVE

Combination of rectifier and inverter modules



Nidec Leroy-Somer's variable speed drive solution is 100%-connected and includes all equipment needed for protecting, controlling, interfacing and running the application up to 3800 kW with full safety. Powerdrive MD Smart is the result of a combination of rectifier and inverter modules, all of them being easily accessible and interchangeable. Compact, robust and ready-to-use, Powerdrive MD Smart is available in a wall-mount version up to 250 kW and

above in free standing, either in IP21 or IP54 protection, whether air- or liquid-cooled. For specific markets, the IP00 chassis version is also available. Powerdrive MD Smart is fitted with a 7" colour touch interface which includes the Systemiz unique all-in-one app, providing a simple and convenient use. Combined with IE5 Dyneo+ motors, Powerdrive MD Smart offers optimum energy performance for the control of pumps, fans or compressors. Nidec is a specialist of motors, drives, generators and related products.

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UHP-SMD FUSE

For high-Power lithium-Ion batteries



In the world of electronics, especially in the automotive industry, the demand for high-performance solutions up to 48 volts DC is ever-growing. To reliably safeguard higher operating currents, the **SCHURTER** UHP fuse appears as a reliable option. Designed for up to 80 volt, this electronic component is engineered to

break the circuit at twice the rated current, all within a maximum of 15 seconds. The UHP fuse significantly reduces worst-case power by over six times when compared to industry-standard fuses. Its innovative design offers a high breaking capacity of up to 3000 Amps at the Safety Extra Low Voltage (SELV) level. This versatility extends its usability beyond the automotive sector, making it a available for data centers, telecom applications, and even heavy-duty power tools. For applications up to 50 volts, SCHURTER also provides the UHS fuse, featuring a slightly lower breaking capacity but still delivering reliable overcurrent protection. The device comes with high breaking capacity up to 3000 A, safe tripping in 15 s at twice the rated current, and operates at high range of operating temperature.

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N° 11 - NOVEMBER 2023

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Manufacturing-X: Digitized Supply Chains for the Manufacturing Industry

Greater Resilience, Sustainability, and Competitiveness

The Manufacturing-X initiative will provide the manufacturing industry with an independent and trusted data space that will enable supply chains to be digitalized and become more resilient. The aim is to increase the competitiveness of German industry and to establish a sustainable circular economy.

Global supply chains have been shown to be very vulnerable to disruption in recent years due to the effects of the coronavirus pandemic, the Russian invasion of Ukraine, and climate change. It has also become clear that companies that rely upon supply chains find it difficult to share data digitally and do so too infrequently because neither standards nor appropriate infrastructure are in place.

For example, information about current inventory or emerging needs is not reliably available and it is therefore extremely difficult to plan for the future.

This is where politicians see potential. Funded by the German Federal Ministry for Eco-

nomics Affairs and Climate Action (BMWK), the Manufacturing-X initiative aims to safeguard and increase the competitiveness of German industry, which is dominated by medium-sized enterprises. Above all, digitalizing value chains should generate resilience and establishing closed-loop economies should improve sustainability.

Data Sovereignty in the European Ecosystem

Manufacturing-X relies on a secure and trusted data space, the system architecture of which was developed with the participation of well-known German companies as part of the European GAIA-X project. The independent European data ecosystem uses secure open technologies and decentralized units to provide trustworthy and transparent infrastructure. This allows medium-sized companies to act independently and on their own initiative in the digital space—a concept often called “data sovereignty.”

At first, GAIA-X was dismissed as being Eu-

rope’s answer to American hyperscalers, and was said to have little impact and no practical relevance. However, that all changed when the Catena-X initiative, which was launched at the 2021 Hannover Messe, successfully applied the principles and system architectures developed in GAIA-X. Catena-X provides a scalable and extensible ecosystem for all participants in the automotive value chain. This means that collaborative use can be made of a universal database and all participants in the value chain remain connected at all times. The decentralized structure ensures that data is always controlled by the company that provided it.

The Eclipse Dataspace Connector (EDC) is used for secure data communication in GAIA-X. The EDC ensures contractually secured, interoperable point-to-point communication with consistent semantics by working with separate channels for communication control and processing (“Control Plane”) and the useful data to be exchanged (“Data Plane”). A special use case related to the automotive life cycle and featuring Catena-X enabled specialized companies to recycle vehicles at the end of their useful life by re-using individual parts in a targeted manner on the basis of their data and therefore keeping them in a circular economy.

The untapped potential in this area alone becomes clear when we consider that less than 9 % of the materials used in cars are currently recycled—primarily because crucial information is missing for the other 91 %.

Catena-X as a Blueprint

Catena-X is seen as a blueprint for Manufacturing-X, although there are some differ-



Greater competitiveness for the manufacturing industry





Greater supply chain visibility

ences between the automotive industry and other manufacturing sectors. The design and manufacturing processes of different automotive brands differ considerably less than the brands of other discrete products from different manufacturing sectors where great heterogeneity and diversity prevail. Furthermore, the value added in automotive production is largely hierarchical (OEM, Tier 1, Tier 2, Tier 3), in contrast to the complex value-added networks in other manufacturing sectors. Finally, automotive market conditions are unique. In Germany, three Groups (Volkswagen, Mercedes, and BMW) comprise more than 50 % of the automotive market, while more than 80,000 companies of various sizes operate in other manufacturing sectors.

To take these differences into account, Manufacturing-X focuses on the product lifecycle instead of focusing on the value chain like Catena-X does.

One of the most important standards for Catena-X and Manufacturing-X is the asset administration shell (AAS). This concept, which was developed by the Industry 4.0 platform, was adopted as IEC 63278-1 in the

IEC 63278 series of standards and standardizes the digital representation of physical assets. The AAS is divided into submodels, which in turn consist of files, feature lists, or even individual descriptive features. The International Digital Twin Association (IDTA), an organization founded by the industry associations VDMA and ZVEI, which includes more than 100 well-known companies from around the world, is responsible for the development and administration of submodel templates. The IDTA makes all AAS specifications and submodel templates available for download, free of charge.

Applications

An interesting use case for digital data exchange over the entire value chain is the provision of data for the digital product passport (DPP).

This EU measure is set to be introduced in several key industries by 2024. The DPP contains information on the authenticity, origin, supply chain, and production of a single product and ensures product traceability and the implementation of a sustainable circular economy.

In practice, transparent digital supply chains should be used to detect supply bottlenecks in time, identify faulty batches, and determine product carbon footprint (PCF), for example. It is especially challenging for manufacturers to accurately calculate the PCF of individual products, since a large proportion of CO2 emissions are generated by suppliers and not by the manufacturers' own production activities. Reliable supplier information is therefore required. Identical products may have different CO2 balances depending on the suppliers used.

Manufacturing-X is still in the early stages of implementation. The German Federal Government has provided a sum in the hundreds of millions for funding. Companies are currently forming consortia that can provide relevant products and services. Use cases will subsequently be developed to prove the benefits of digitalized value chains. The technologies and platform structures will only become commonplace if those involved see the benefits.

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N° 11 - NOVEMBER 2023

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The Revolution of Feedback Systems with GMI

IEN Italia interviewed Massimo Redaelli, Technical Director, and Manuel Fabiano, Product Manager of Servotecnica, on the Flux range, which is designed for compactness and precision in automation applications.

IEN: Servotecnica has a long and successful history in the motion control sector. Could you share with us some of the pivotal moments that have contributed to your success, including details about the introduction of proprietary products and strategic collaborations with companies like Flux?

Massimo Redaelli: Servotecnica's success story has been built on a foundation of consistent commitment to innovation and technical support, along with a wide range of products and solutions covering all aspects of industrial automation.

Servotecnica began its operations in the 1980s, and since then, over forty years of continuous presence in the market have passed. Our primary commitment has always been to provide products for industrial automation. Initially, we operated as importers and distributors, but we always placed strong emphasis on technical support, recognizing that technological products require specialized assistance. Over time, we have also expanded our activities to include the design and engineering of custom mechatronic components, closely collaborating in an integrated manner with our customers. This design approach has become a fundamental element of our offering. Throughout our history, we have distributed other manufacturers' brands, but in the last 7-8 years, we have successfully introduced our own branded products, known as Servotecnica, including rotary collectors, micromotors, and drives. Additionally, we have established an international presence with a specific division for the German market called Servotecnica GMBH, covering German-speaking countries, as well as collaborations with distributors across Europe, including France and Spain. Another significant step was the opening of an office in the United States to serve the American market.

Our product offering covers the entire chain of industrial automation, providing solutions ranging from central control to mechatronic components and feedback systems, the "eyes." One of the flagship products I would like to mention is our Flux feedback system, based on the patented GMI (Giant Magneto-Impedance) technology, which represents an innovative and unique solution for precise angular and linear position measurement.

First and foremost, it's important to highlight our close collaboration with Flux, an Austrian company with which we share not only a long-standing personal relationship but also a solid business partnership. Flux is relatively young as a corporate entity, but it is backed by

MASSIMO REDAELLI, TECHNICAL DIRECTOR OF SERVOTECNICA

Massimo Redaelli began his career at Servotecnica in 2001. As an electrical engineer by training, he started in the technical department, focusing on technical aspects and dealing with drive programming as well as control board programming for axes. Later on, he acquired valuable expertise in the commercial field, leveraging his strong technical foundation to successfully promote the company's products. In his 22 years of work at the company, Massimo has made a significant contribution to its growth and development, playing a key role in the area of control systems. More recently, he has focused his attention on direct drives and feedback. Over the past five years, he has returned to a technical role, taking on the position of Technical Director. In this role, he led the reorganization of the technical department, established a dedicated research and development area, and optimized customer service. These initiatives demonstrate his commitment to successfully addressing future challenges.



extensive experience and expertise. Their products are closely integrated with the Servotecnica range, initially with rotary encoders, and this year with the introduction of linear transducers for direct linear position measurement.

IEN: What are the distinctive features of Flux's product families? Specifically, what are the typical applications where each of these families excels, and what are the main advantages they offer?

Manuel Fabiano: I would start by stating that right from the beginning, the presentation of this innovative technology has piqued my





MANUEL FABIANO, PRODUCT MANAGER OF SERVOTECNICA

Manuel Fabiano, already has a decade of experience in the field of industrial automation, with a primary focus on encoder technology. In May 2023, he joined Servotecnica as the Product Manager. His main area of expertise pertains to transducers, with a particular emphasis on the Flux range. Manuel plays a key role, personally managing relationships with the represented companies. He works in synergy with the Italian sales force, directly serving customers and supporting facilities in Germany and the United States.



strong interest, being someone personally experienced and passionate about the field of encoders. These are products that stand out for their use of patented technologies, representing a real novelty in the market because they combine the precision of optical encoders with the robustness and ease of installation of magnetic encoders. This synergy is of significant relevance, especially for applications that require high precision and push the boundaries of performance. Flux introduces three distinct product families to the market: GMI Rotary, GMI Angular, and the Inductive Encoder family. It's important to note that in terms of sequence, the GMI Angular represents the highest-precision solution among the three, followed by the GMI Rotary and the Inductive Rotary.

Regarding the first two families, GMI, as the acronym suggests, refers to the patented technology developed by Flux, which constitutes a noteworthy innovation in the industry. Both products in these families are characterized by high performance and precision. One of them represents the top-of-the-line offering, delivering exceptional performance and suitability for applications demanding maximum

structural performance and high-quality materials. The other, also of remarkable quality, is ideal for highly demanding applications. The last family, the Inductive Encoder family, unlike the other two, does not use the patented GMI technology. The distinctive feature of this line lies in its compactness and the absence of external housings. Despite the lack of an external casing, these encoders maintain extremely compact dimensions while offering a level of precision

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that challenges market expectations. This statement is based on in-depth industry research, highlighting that we are talking about absolute encoders capable of providing extremely accurate absolute position.

Recently, we have expanded this range with the introduction of two new models, the 45 and the 34, with numbers clearly reflecting the product dimensions in millimeters. This expansion was motivated by the growing need for compact products in applications that require limited space. An important point to note is that this initiative coincided with the market entry and increasing demand for integrated solutions, such as integration with micromotors.

M. R.: Certainly, it's also important to emphasize another element of significant relevance, which is ease of installation, a crucial factor for many of our customers. In other words, we're talking about extremely precise encoders that, despite their precision, do not impose highly stringent requirements in terms of mechanical integration. In today's landscape, many high-precision solutions demand equally precise, if not more so, mechanical integration during assembly. This results in micrometric assemblies and highly precise mechanical processes, which can be costly, complex, and sometimes challenging to achieve. In some cases, the solutions available on the market impose such requirements.

However, Flux products, thanks to the technology they employ, offer an intriguing combination of characteristics. They are a fusion of magnetic and inductive technology, benefiting from the unique features of both. This means they inherit the ease of installation typical of magnetic technology, which requires less mechanical precision. At the same time, they maintain the high positioning precision associated with inductive technology. This synergy between the two technologies is crucial, as it fully meets the customer demand for maximum precision without the burden of highly stringent mechanical requirements.

IEN: What are the primary applications in which Flux products find maximum utility and distinctive advantages? How have these solutions helped address specific challenges in industrial or technological sectors?

M. R.: The main applications we have addressed span across various industrial sectors. In particular, the aerospace and radar sectors have been a focal point for us, thanks to the distinctive characteristics of our products. In addition to the required precision, these sectors place significant emphasis on environmental ruggedness. For instance, in the aerospace sector, it is crucial to have products that can operate effectively in extreme temperatures, ranging from -60°C to +80°C or more. This operational thermal excursion is essential to ensure the reliable functioning of equipment such as outdoor radar or telescopes used in extreme conditions, such as in Antarctica.

Applications in the field of machine tools, including rotary heads and rotary tables, represent another area of product usage.

Looking to the future, it's worth noting that we are expanding our range with the introduction of linear encoders. This sector offers various opportunities, such as in printing machines, large format printers, cutting machines (both laser and blade), and a wide range of applications, including the medical and robotics sectors.

M. F.: The robotics sector is undeniably one of the most significant trends in industrial automation and is widely discussed in this field. Robotics is one of the primary reference markets for Flux, and this choice is well-founded.

Why? The answer lies in the complexity of the challenges that robotics faces today. In robots, especially in collaborative and surgical robots, there is a significant limitation in terms of physical space. There is not enough space to install new components; in fact, there is a constant effort to minimize the existing components on the unit, arm, or machine itself.

However, along with this constraint on physical space, there is an enor-





mous demand for extraordinary performance. For example, in collaborative robots or surgical robots, which perform highly precise tasks and sometimes replace human work, there is no room for error. This is where Flux comes into play with a product that combines these two elements: it is compact, easy to install, and at the same time, it does not sacrifice precision but even takes it to a higher level.

IEN: You mentioned the possibility of integrating Flux products with Servotecnica's control solutions. Could you provide further details on this integration? Additionally, could we explore further the solutions offered by Servotecnica?

M. R.: Certainly, a concrete example occurred in the aerospace sector, but currently, we are applying a similar approach in the maritime

sector, to be more specific, in the context of yachts. Our customers requested a solution that would allow the rotation and tilting of an object with specific torque and precision requirements, in addition to the need for a safety parking brake. The challenge was to find a product that combined all of these features. Therefore, our design department embarked on the mission to develop a suitable solution. We already had the frameless motor and the encoder, but we were lacking the brake component. The concept of a frameless motor is that it is a "naked" component that needs to be integrated and supplied to the customer as a complete package, including a reducer, especially because torque was a crucial element in this application. Finding the right motor capable of generating these torques was not at all straightforward. Among the products at our disposal, we





evaluated the use of a cycloidal reducer, a frameless motor, and a Flux encoder. As for the parking brake, we had to search for a solution on the market. Although these components are distinct when viewed individually, they were integrated, designed, and assembled internally: the design process is entirely within our competence. The result was a finished and complete product, of which we will present a detailed preview in Nuremberg, precisely because it is a concrete example of the integration between products and mechatronic solutions I mentioned.

IEN: What specific products or innovations from the company will be presented at the upcoming SPS (Smart Production Solutions) event in Nuremberg on November 14, 15, and 16? Are there any previews of what we can expect to see?

M. F.: At the SPS trade fair in Nuremberg, Servotecnica's booth will showcase the three fundamental pillars of the Flux range. These include the two GMI product families and the new range of miniaturized inductive encoders. The latter represents the main novelty, even though the products have already been introduced to the market and are the subject of ongoing projects. The fair marks the first large-scale presentation to the public. On this occasion, visitors will have the opportunity to delve into the high level of integration they offer. They can experience these products firsthand, testing not only their exceptional compactness but also their extreme precision.

What we have decided to focus on is a renewed overall vision that encompasses our entire portfolio and approach to the market. It represents a constant drive for innovation that allows us to present ourselves as a continuously evolving company.

Furthermore, we will bring some products provided by selected partners that have successfully passed Servotecnica's rigorous evaluations. This will demonstrate our ability to offer integrated solutions in collaboration with other industry players.

M. R.: In addition to Flux products, other Servotecnica products, such as our coreless micromotors, which represent another cornerstone of our catalog, will also be showcased at the SPS trade fair in Nuremberg. We will also have our rotary collectors on display, known as slip rings: devices used to transmit electrical signals from a stationary station to a rotating one.

We aim to highlight our integration capabilities, and to do so, we will present concrete application examples. For instance, we will display pruning shears in which our micromotors are integrated. You will be able to see an exploded view of a motor, brake, encoder, and reducer, as if it were an X-ray photograph. This representation emphasizes how our products are synergistically integrated to create complex solutions. It will be a unique opportunity to convey the breadth of our expertise and integration capabilities.

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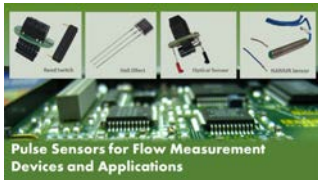
The system-on-modules from **ARIES Embedded**, provider of hardware and software development and standard products for industrial and agricultural sectors, are based on the

Renesas RZ family architecture and provide high performance for embedded systems. The RZ/G2L microprocessor from Renesas includes a Dual Cortex®-A55 (1.2 GHz) CPU, 16-bit DDR3L/DDR4 interface, 3D graphics engine with Arm Mali-G31 and video codec (H.264). "While the MRZG2LS SoM integrates the single/dual Cortex®-A55/Cortex®-M33, the MRZV2LS is equipped with a Cortex®-A55 (1.2GHz) CPU and built-in AI accelerator 'DRP-AI' for vision applications," explained Andreas Widder, Managing Director of ARIES Embedded. "Our new SoMs are ideal for applications such as entry-class industrial human machine interfaces (HMIs), embedded vision, edge artificial intelligence (edge-AI), real-time control, industrial ethernet connectivity, and embedded devices with video capabilities." With the MRZG2LS and MRZV2LS, ARIES Embedded provides their first SoMs compliant with the SMARC® 2.1 standard by SGET.

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'BACK TO BASICS' WITH FLOW METER SENSORS

Technical review of pulse sensors



Titan Enterprises has published a technical review of pulse sensors for flow measurement devices and applications. Flow meters have developed into many forms over the years, from mechanical

devices - such as a turbine or rotating gear - which rely on measurement of a rotational component, to devices that use ultrasound and other advanced technologies. These meters generally use a sensor to relay the flow measurements to a reading device. Nearly all types of flowmeters, from ultrasonic to turbines, are offered with pulse output flow signals. Sensing components used in a flowmeter measure the movement or flow rate of the liquid or gas passing through the system. The pulse output signal from these devices is, in essence, an on/off switch which changes state at a frequency related to the fluid flow. As well as discussing the different sensors primarily used in today's flowmeters and drawing on examples of application, a detailed review of the semiconductor sensor components is also included. Titan's technical review touches on advantages and disadvantages of each sensor type, along with best practice for connecting sensors to the desired read-out device. Defining some of the key functions and recommended applications of these sensors provides a useful comparison to guide the user's decision as to the optimum output for their flow measurement requirements.

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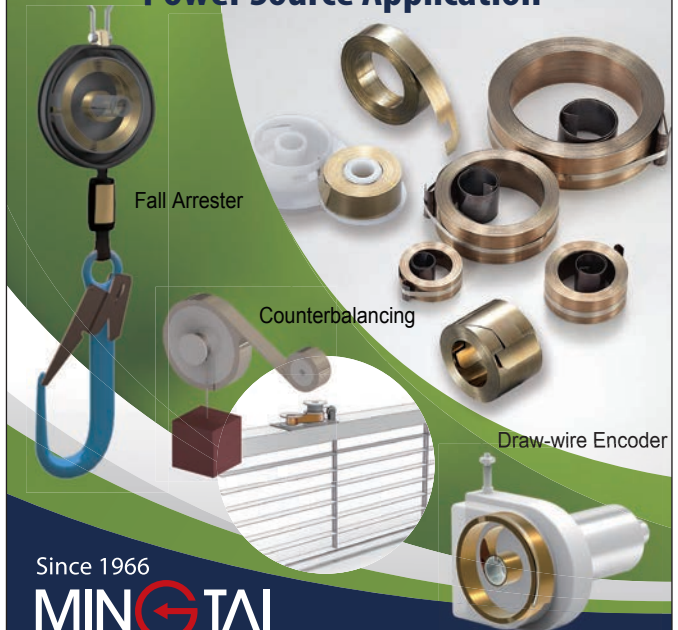
Comes with a hybrid case design



Various cooling technologies have emerged and improved, such as baseplate cooling, heat pipes, liquid cooling, and thermoelectric cooling systems. However, many passive cooling systems have limitations and lose much of their effectiveness when used with higher power systems. To meet the growing demands for fanless designs while simultaneously eliminating the limiting factors of conduction-cooled power supplies, **Traco Power** has been working on a novel power supply design that aims to maximize the potential of conduction-cooled systems. The result is the new TCI power supply series, which utilizes an innovative hybrid case design, part encased and part encapsulated. While the metal case ensures optimal heat transfer to any baseplate or case, the special potting compound does the same for the individual components by establishing an ideal thermal connection to all critical components which is otherwise hard to achieve within conventional power supply designs. By combining the best aspects of both case types, the TCI series has superior thermal capabilities and can reach much higher power levels without the need of a fan within the same form factor compared to traditional power supply designs. When used in a conduction cooled setup the TCI series is able to deliver 80 to 100% of the rated maximum output power, making it an ideal solution for fanless application setups.

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Apex Dynamics Gearboxes Chosen for PTG Holroyd's Ultra-precise Helical Profile Grinding Machines

Apex Dynamics' 'A' Series planetary gearboxes are used by precision machine tool manufacturer PTG Holroyd in its ultra-precise CNC helical rotor and gear grinding machines.

PTG Holroyd has selected high torque, low backlash precision planetary gearboxes from Uttoxeter-based Apex Dynamics' APC and AD ranges, for use in its ultra-precise helical rotor grinding machines.

Founded in 1860, and with more than a century of experience in the manufacture of helical components, Precision Technologies Group (PTG) company PTG Holroyd is a world-leader in its field. It produces high-precision gear, rotor, screw and thread milling and grinding machines for a range of sectors including the compressor industry. All PTG Holroyd products are built to exacting specifications in Rochdale, Greater Manchester, by a team of expert engineers, fitters and electricians.



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MACHINE TOOLS**

High precision and accuracy key to PTG Holroyd's success

Gearboxes are an integral part of PTG Holroyd's technology as they drive the axes in its machines, making accuracy and precision key. The company had very specific requirements for output torque, accuracy and product dimensions, and was looking for the gearboxes that best fulfilled them.

PTG Holroyd approached planetary gearbox specialist Apex Dynamics with a set of tight

specifications for its helical grinding machines, which Apex was able to meet with its APC and AD series of gearboxes.

Apex Dynamics UK provides the high-performance components insisted upon by PTG Holroyd

Working alongside PTG Holroyd's engineers and design teams, Apex Dynamics UK identified the best possible products for the machine tool manufacturer's helical grinding machines. This prompted PTG Holroyd to use Apex Dynamics for a number of its planetary gearboxes.

The specific Apex Dynamics' high precision planetary gearboxes best-suited to PTG Holroyd's helical grinders were from the APC-Series of rotary flange style gearboxes (with 55 to 1 ratio) and the Apex AD-Series of compact gearboxes (with 50 to 1 ratio). Both Apex Dynamics product ranges deliver high torque, low backlash of less than 1 arc-minute and superior levels of accuracy; ideal for PTG Holroyd machines.

The APC-Series comes with a patented curvic coupling output, giving a high concentricity, low runout, high torque, zero backlash connection. Its case hardened and ground gearing offers high accuracy and high wear resistance for the gear train, and by adding a fourth planetary gear torque capacity is boosted by up to 25%.

The compact helical, one-piece planetary cage design of the Apex AD series provides



PTG Holroyd with a range of benefits, including the stiffest and most accurate rotating flange design currently on the market. It can deliver superior accuracy of less than 1 arc-minute with as short as 70mm flange to flange, making it capable of fitting into the smallest spaces.

High performance products and strong customer service supplied by Apex Dynamics

PTG Holroyd has praised the reliability, strong customer support and engineering knowhow provided by Apex Dynamics UK, which has worked closely with the Rochdale business to ensure its precision planetary gearboxes are supplied quickly.

Purchasing products directly from Apex Dynamics means PTG Holroyd is able to take ad-

vantage of the excellent delivery times Apex offers its customers. Apex Dynamics UK guarantees delivery within 3 – 4 weeks and provides a total supply package of high-quality products, accurate and efficient quotes, fast delivery, good customer service, excellent technical information and ongoing support.

Philip Hart, PTG Holroyd Technical Director, says, "We have been using Apex Dynamics products for some time in our machines and have been very pleased with the relationship we have built with the company. When we looked for the correct gearboxes for our high precision applications, we found Apex Dynamics products to be very reliable and able to meet our high standards for speed, accuracy and precision at the interface between motor and machine."

Malcolm Hillary, Northern Area Manager for Apex Dynamics UK, adds, "PTG Holroyd is a great company to work with and has a rich history. Our product range and customer support is ideally suited to its advanced high-precision helical grinding machines.

"I truly believe we offer the best gearboxes in the world and a unique full-service package that is unsurpassed in the industry. With 49 series of gearboxes, more than 20 years' industry experience, and the highest level of technical production capabilities, we can supply the best-possible advanced high speed, low backlash solutions for any needs - that's why we are winning more and more business across the UK."

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This versatile multi-purpose sensor from **Labfacility** has been specifically designed for use in and to protect against corrosion in harsh or wet environments. It has a quick response time and can be easily cleaned. The impermeable PFA insulated flexible wire thermocouple provides exceptional resistance to oils, fluids,

gases, and chemicals and is electrically isolated. The thermocouple tip contains the beaded sensing connection, which is weld-sealed to give a continuous PFA coating along the entire length and provide an atmosphere that is airtight and moisture-proof. This sensor is used in typical applications such as pharmaceutical, autoclaves and sterilisation, food & catering, and other environmental applications. This IP67 wire thermocouple has an hermetically sealed airtight tip but is also waterproof & suitable for insertion into liquids. It has an oil & chemical resistant PFA insulation. The sensor is designed for use in temperatures ranging from -75 to +260 Degree C. Its electrically insulated tip is tested to 1.0Kv as standard. Last, the stranded conductors are flexible 7/0.2mm (24AWG).

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LOW EARTH ORBIT SATELLITE LENSES

Application optimised lenses for satellite developers



Resolve Optics is a leading European designer and supplier of application optimised lenses for satellite developers seeking to operate optical instruments in Low Earth Orbit (LEO). Low Earth Orbit (LEO) satellites orbit at an altitude of 160 -1000 km - which is low compared to other orbits,

but still very far above the Earth's surface. Most LEO satellites are used for observation and science as being nearer the Earth's surface allows optical instruments to take higher resolution images. Customer support manager Rob Watkinson said "Optical instruments for use in space are designed to survive a specified total absorbed radiation dose (expressed in Rad) over the lifetime of a mission. Standard glass types will turn dark as they absorb radiation and although the radiation levels in LEO are relatively low, over an extended period of time a standard lens will still deteriorate until the point it is no longer useable. Generally, we recommend that any LEO mission lasting a year or more, should use radiation resistant optics to guarantee good transmission for the entire length of the mission. However, sometimes there may be a performance criterion that is considered more important than longevity". He concluded "The key considerations when designing lenses for use in LEO satellites is how they react to the vibration and shock of launch, extremes of temperature, high vacuum and the cosmic radiation encountered in space".

►► 64201 at www.ien.eu

Leuze Latest Innovations at SPS 2023

Safety solution for safeguarding transfer stations at robots and automated guided vehicles (AGVs) as well as detection the presence of objects will be presented.

The trade show booth is set to be lively and interactive, a place that invites you to come and talk to the Sensor People. Make yourself at home and find out more – this is Leuze's motto for this year's sps. Trade show visitors can look forward to the Sensor People's new trade show appearance. Apart from its latest product innovations and highlights, the sensor expert will also be presenting itself as a global player in the areas of production, logistics and service. And, of course, the trade show booth will reflect the company's 60th anniversary too.

In focus: Sensor and safety solutions for intralogistics

Much of the trade show booth will be taken up with sensor and safety solutions specially designed for intralogistics: At its trade show booth, Leuze will be giving a live presentation of a shuttle system which can process containers and unstable bulk packaging in a wide variety of different formats. With the aid of various Leuze sensors, challenging automated order-picking solutions are realized for all areas of warehouse logistics. Furthermore, besides its product innovations for intralogistics, Leuze will be showcasing an addition to its huge range of safety solutions. This new safety solution safeguards transfer stations at robots and automated guided vehicles (AGVs). Leuze will also be demonstrating an AGV in action, safeguarded by Leuze's RSL 400 safety laser scanner.

"More than you expect": solutions for packaging processes

This is the slogan under which innovative sensors for automated packaging processes in



The IVS 108 is ideal for detecting the presence of objects and can be set up quickly and easily by means of a simple teach-in.

the food and pharmaceutical industry will be exhibited at the Leuze trade show booth. The sensor expert will be showcasing new robust stainless-steel sensors in different shapes and sizes that have extremely smooth stainless-steel surfaces, a high level of resistance against cleaning agents and a high degree of leak tightness. In addition, Leuze will also be presenting new, high-performance image processing tools. The sensors of the Simple Vision series convince with their flexible usability and easy handling. The new IVS 108 is suitable for detecting the presence of objects. Devices of the IVS 1048i / DCR 1048i series additionally perform counting and measuring tasks or read codes.

The 60 years are an important milestone in the company's history

And, of course, the company anniversary will



Depending on the model, the functions of the IVS 1048i range from object detection and measuring tasks to integrated bar code reading.

also be celebrated at the trade show booth. How did Leuze become an international sensor expert for automation technology when it was originally known for spinning and weaving? Visitors can find out the answer to this question and discover much more about the company at the Leuze trade show booth: What were the technological milestones in the company's history? How did internationalization take place? And: Who are the Sensor People anyway? They are looking forward to meeting their customers personally at the trade show. They will be discussing actual challenges together with their customers and partners, find solutions, and make them even more efficient. Because the lasting success of their customers in a constantly changing industry is the goal and claim of Leuze.

►► 64204 at www.iien.eu





Alcatel Submarine Networks (ASN) Delivers its Digital Transformation with PTC solutions

To meet growing demand for submarine cables, the Nokia subsidiary has introduced a 5G digital strategy based on digital continuity of all its operations. ASN has fully embraced industry 4.0 by digitizing its product literature and automatically coordinating its PLM, ERP and MOM systems, thus achieving digital continuity.

Alcatel Submarine Networks (ASN), leads the industry in terms of transmission capacity and installed base with more than 650,000 km of optical submarine systems deployed worldwide. The company designs, manufactures, installs and maintains submarine cables and ancillary equipment with its own fleet of ships to deliver fibre optics all over the world.

ASN has two factories, one located in Calais – the biggest – which manufactures cables and the other in Greenwich which produces amplifiers and repeaters. In the face of a steep rise in market demand stemming from increased need for reliable network transmission and Cloud and deep-water oil and gas exploration services, ASN wanted to improve its operational performance while still maintaining optimal quality.

Synchronizing tools to form a single ecosystem

The project is the end result of a series of productive meetings between the managements of the various departments; they pinpointed the fact that the main challenge lay in the management of paper documents. It was often time-consuming and caused issues in product traceability and training new members of the workforce. So with the strong growth in ASN product sales it was becoming difficult for the sales department to centralize information and circulate it upstream or downstream to process a number of requests.

Drawing on these insights, the project team decided to create a digital thread through which information can flow easily from one system to another. It is based on three fully synchronized key elements designed to cen-



tralize data: PLM, MOM and ERP.

The digital thread begins with design data from Creo CAD software. Windchill PLM solution centralizes and manages all product software. The ThingWorx industrial IoT platform that ASN uses for its MOM, is the integration platform between Windchill data and ERP manufacturing data.

Initial results conclusive on a pilot product

"We have embarked upon a far-reaching transformation to make gains in efficiency and respond to the changes of a rapidly expanding market. A bold industry 4.0 programme based on 5G and digital continuity underpins our pursuit of innovation and good performance at the service of our customers", comments Omar Bougad, ASN's engineering supply chain manager.

Project implementation started on one product in particular: PRM, a new system of permanent oil slick (reservoir) monitoring, the result of collaborative manufacturing between the Trondheim R&D site in Norway and the factories in Greenwich and Calais. The initial design

Depending on the model, the functions of the IVS 1048i range from object detection and measuring tasks to integrated bar code reading.

phases were carried out by the teams in Trondheim. Design data was loaded into Windchill to be shared in real time with the Greenwich plant, where the PRM system is assembled, then Calais, where it is finalized.

Previously, production data, only available in hard copy form, did not leave the factory, but now the full product information

stream is available for the teams in the two plants at all times, within a single ecosystem, thanks to synchronization of tools.

Specifically, this is data on product specifications, the manufacturing machines used, the date of manufacture and any information necessary for traceability. ERP, on the other hand, provides information on the raw materials and sub-assemblies used and suppliers.

This continuous digital chain rolled out over the whole process has wide-ranging benefits. It can also use PLM and ERP data to generate manufacturing procedures and instructions.

At the moment, thanks to the commitment of all stakeholders, the project team, PTC and, above all, ASN staff who have been deeply involved from the very beginning of the project, the first stage is being rolled out on production sites. Integration of the ecosystem as a whole will be fully functional on the PRM system by late 2023. The idea now is to roll out this digital thread over the whole range of ASN products and services.

►► 64205 at www.ien.eu



Companies in this issue

ORANGE FOR COMPANIES ADVERTISING IN THIS ISSUE

A	ANALOG DEVICES	10			
	APEX DYNAMICS	26			
	ARIES	25			
C	CIRCUIT DESIGN	21			
	CLPA	1, insert			
I	IC-HAUS	12			
K	KONTRON	8			
L	LABFACILITY	15, 27			
	LEUZE ELECTRONIC	28			
	LIKA ELECTRONIC	17			
M	MING TAI	25			
	MITSUBISHI ELECTRIC	9			
N	NABTESCO PRECISION	11			
	NIDEC LEROY SOMER	17			
P	PEPPERL+FUCHS	18			
	PORTESCAP	17			
	PTC	29			
R	RESOLVE OPTICS	27			
S	SCHMERSAL	16			
	SCHURTER	17			
	SERVOTECNICA	13, 20			
	SPRINT ELECTRIC	7			
T	TE CONNECTIVITY	14			
	TITAN ENTERPRISES	25			
	TRACO ELECTRONIC	25			
	TSUBAKI KABELSCHLEPP	6			

upcoming events

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14 – 16

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27 – 28

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25 – 26

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MARCH

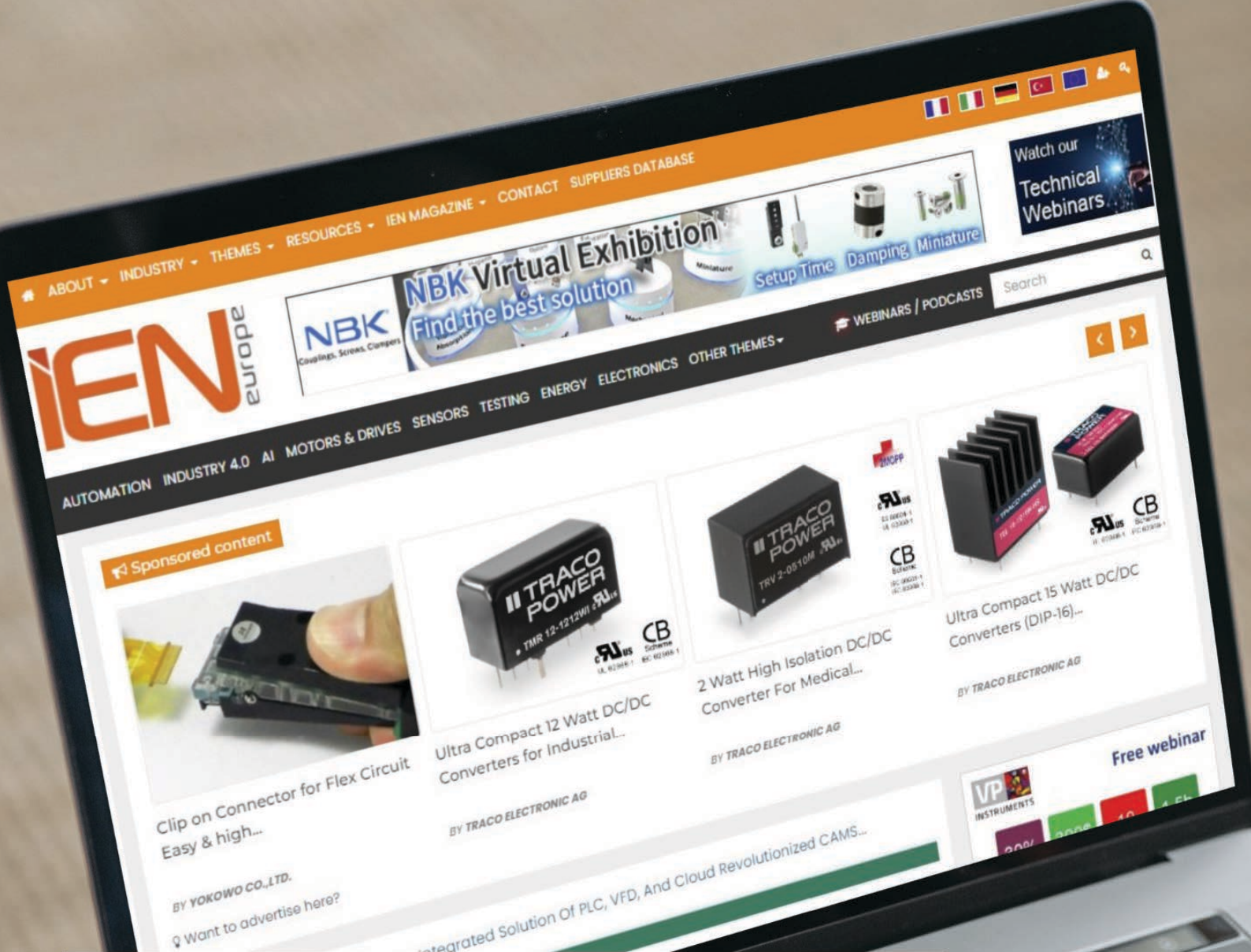
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