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INDUSTRIAL ENGINEERING NEWS

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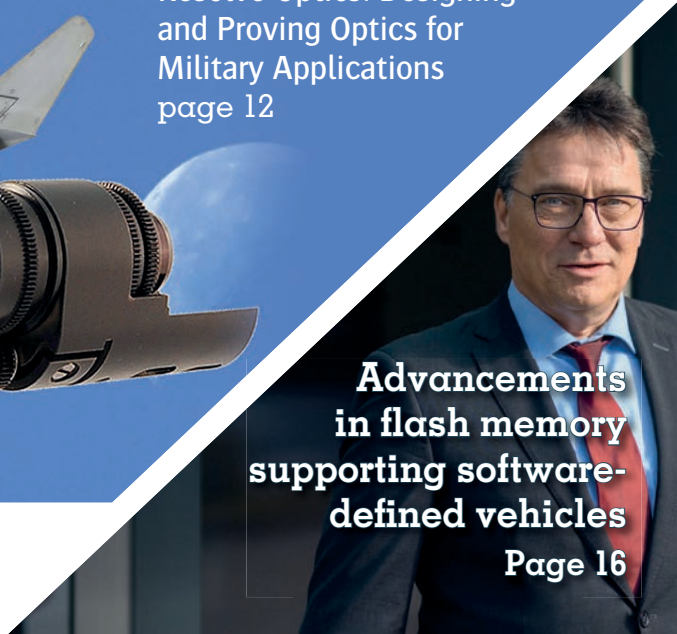

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editorial

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Dear Readers,

We hope that you had great holidays upon your destination: very high temperatures in southern Europe and mixed feelings in the upper part. IEN Europe continued its journey through the come-back of industrial fairs and events with the Siemens Realize Live event that took place in Las Vegas. We provide you with a quick recap of the annual global event.

Motek is coming and of course, IEN Europe will gather the party and cover the event to bring you latest updates on the Stuttgart annual event. In this September issue you will find a short preview with the Yamaha new cobot as well as an EV battery test station.

Furthermore, we made a special AI IEN supplement dedicated to cybersecurity coming with the National Insider Threat Awareness Month (NITAM) that will take place throughout each Wednesday during the month of September.

Lastly, do not miss our exclusive interview page 12 that was set up with Rob Watkinson, Customer Support Manager at Resolve Optics. We discussed the key considerations when designing and supplying high quality fixed focus and zoom lenses to be deployed for military use in demanding battlefield environments.

We wish you a pleasant and interesting reading.

Editor for IEN Europe

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Artificial Intelligence for Industry

Automation: Intelligent Components and Solutions

IIoT - Industry 4.0 - Smart Factory

Industrial Safety

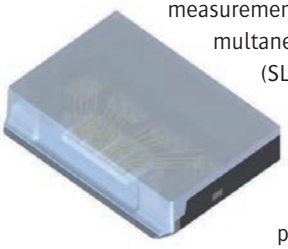
Energy Efficiency Business & Industry (EEBI) Battery Energy & Storage

TE Connectivity launches an all-cash public tender offer for all publicly held registered shares of Schaffner

TE Connectivity Ltd. and Schaffner Holding AG announced on August 17, 2023, that TE will launch an all-cash public tender offer for all publicly held registered shares of Schaffner for CHF 505 per share (the "Offer"). The Board of Directors of Schaffner unanimously recommends the shareholders to accept the Offer. As of today, in addition to Schaffner's largest shareholder BURU Holding owning ca. 17.2% in Schaffner, four additional private and institutional shareholders owning ca. 20.3% in Schaffner have entered into an undertaking to tender all of their shares in Schaffner into the Offer. The tender offer is subject to customary terms and conditions as well as regulatory approvals and is currently expected to be settled in December 2023.

Mouser Now Shipping ams OSRAM SPL S1L90H 1-Channel SMT Laser for Industrial LIDAR

Mouser is now stocking the SPL S1L90H 1-channel SMT laser from ams OSRAM. The SPL S1L90H SMT laser gives engineers improved performance and easier optical integration for long-distance industrial ranging and LIDAR applications, such as drones and robots, as well as building and industrial automation. The SPL S1L90H is a versatile, small aperture, edge-emitting laser (EEL) in a surface-mount (SMT) package with advanced chip technology. It features the highest peak power (65 W) and average power in the small package class. The device is one of the first surface-mount, edge-emitting lasers to have a 110 µm aperture, enabling a very narrow beam. This device features ams OSRAM's multi-junction technology, consisting of three vertically stacked emitters in a single laser die mounted inside the device's quad flat no-lead (QFN) package. This technology results in better target area illumination at long-range distance measurement, 3D optical sensing, and simultaneous localization and mapping (SLAM) applications. The SPL S1L90H's optimized, power-efficient pulsed laser enables a maximum pulse width of 50 ns and is suitable for pulses shorter than 2 ns.



Renesas to Acquire Cellular IoT Technology Leader Sequans Through Tender Offer

Renesas Electronics Corporation and Sequans Communications announced that the two companies have entered into a memorandum of understanding (the "MoU"). Pursuant to the terms of the MoU, Renesas will, following consultation of the Sequans' works council and favorable recommendation by the Sequans Board, commence a tender offer to acquire all outstanding ordinary shares, including American Depositary Shares (ADS) of Sequans for $3.03 per ADS (each ADS representing four ordinary shares) in cash. The transaction values Sequans at approximately $249 million, including net debt, and is expected to close by the first quarter of calendar year 2024. Upon closing of the transaction, Renesas intends to integrate Sequans' breadth of cellular connectivity products and IP into its core product lineup, including microcontrollers, microprocessors, analog and mixed signal front ends. The acquisition will allow Renesas to immediately expand its reach to the Wide Area Network (WAN) market space encompassing a broad range of data rates. It will also enhance Renesas' already rich portfolio of Personal Area Network (PAN) and Local Area Network (LAN) connectivity products.

Lane Motorsport Value-Added Assembly Service used for the world's first 5G Motorsport telemetry device

Lane Motorsport has helped a leading UK motorsport cellular telemetry solution provider with fast delivery from stock of high-performance connectors for the launch of a market leading new device which can deliver live 5G data to team garages using the best network available at any point on the track. Lane Motorsport is a specialist division of Lane Electronics and is dedicated to meeting the electrical and electronic interconnection demands of motorsport in all its forms. Using products from its wide stock profile and a prestige in-house value-added assembly facility Lane Motorsport can specify and supply standard connectors and accessories and provide specially configured connectivity solutions for bespoke requirements, on very short lead-times. For this application the customer needed a particularly high contact density connector with proven motorsport credentials. The Souriau 8STA motorsport connector by EATON is already a popular choice given its low weight, compact size and reliable metal-bodied construction and here an ultra-compact 26 way version of the connector accommodates 2 x 10Gb Ethernet, 1 x 100Mb Ethernet and 1 x USB connectivity.

Siemens Realize LIVE Global Event: Recap

"Be the change" was the mantra at this year's Realive LIVE. Across the presentations and break-out sessions, Siemens and its ecosystem have explored how the industrial world is growing in complexity, and how we can leverage the best technologies and associated methodologies to address that complexity

Siemens Digital Industries Software's Realize LIVE is the flagship event that brings together Siemens' community of users, partners and experts during two days in Las Vegas.

President and CEO, Tony Hemmelgarn took the stage to update how the transition to a cloud-focused, software-as-as-service, technology company, first begun in 2019 is gaining momentum and scale.

"We told investors at Capital Markets Day that we would have 40% of our ARR be cloud ARR by 2025. Our share of the cloud market is growing impressively. In Q2 of FY2023, we're at 25% cloud ARR vs. 4% in 2020 and very shortly, we'll be at over $1bn in cloud ARR. Our capabilities are helping us with market share," said Hemmelgarn. "74% of cloud orders are from SMB. This creates new opportunities for us to expand, but this isn't just about new customers. Our existing customers have embraced this strategy. In fact, in our existing accounts we are seeing an expansion rate of over 16%."

The approach of deeply connected systems combined with an open ecosystem of partners has also now been adopted by the wider Siemens AG organization as it applies the same principles of combining the real with the digital.

Partnerships & ecosystem

Hemmelgarn also highlighted the importance of building an open eco-system of partners, a core part of the Siemens Xcelerator strategy. From the recent project with Microsoft to leverage generative artificial intelligence (AI) to solve widespread production issue reporting via an AI-enabled integration between Teams and Teamcenter to another recent project for Norwegian battery start-up, FREYR. FREYR are producing batteries with renewable energy from wind power and water. Wanting to scale their annual battery cell capacity, quickly and sustainability, FREYR turned to Siemens in partnership with AWS and Nvidia to build an industrial metaverse of its factories, built on comprehensive digital twin.

President and CEO, Tony Hemmelgarn, addressed the audience on the opening day of Realize LIVE

Aerospace leadership

Realize LIVE has also provided a stage for Siemens to illustrate its leadership in aerospace and defense. From electric, zero emission startsups like REGENT or Wisk, who are using the Siemens Xcelerator platform to build new businesses to industry veterans like Northrup Grumman. BAE Systems and Lockheed Martin. Brian Carbrey, Digital Engineering, Chief Architect, Boeing, delivered the compelling story of a journey that begun 40 years ago and culminating with a ground breaking approach to digital transformation that is paying dividends not only in future facing projects such as the T-7A Red Hawk, an all-new advanced pilot training system designed for the U.S. Air Force but also being applied to bring legacy programs up-to-date, from the F-15 to the B-52 Stratofortress.

Solving complexity for all

A constant theme across the first day's activities focused on solving complexity in engineering and manufacturing across all industries. Hemmelgarn discussed Siemens' approach to providing a singular source of truth in which to solve complex problems, whether in aerospace, defense, automotive or battery manufacturing. "We made sure we have one architecture, seamless between the cloud and on-premise. We're not going to make a chasm for you as you go from one version of software to another. We're going to keep you there and enable you to go where you need. We've in-

vested heavily to make sure we're not creating those kinds of problems for customers but creating an opportunity for our customers to leverage our technologies."

Day two

The second day of Realize LIVE symbolized the "Be the change" mantra. Perhaps best illustrated by Easton LaChapelle, co-founder and CEO of Unlimited Tomorrow, who took the stage to tell the story of how his childhood passion for robotics and a chance encounter with a young girl with a prosthetic arm led him on a journey of innovation powered by Siemens technology.

Unlimited Tomorrow empowers individuals with upper limb differences by making high quality, low-cost bionic prosthetics that are easily accessible. Bringing together mass customization, patient-specific fit and the power of additive manufacturing, LaChapelle exemplifies the idea of "Be the change".

Sustainability as a business driver

The day's general sessions also brought together organizations working across a wide gamut of industry to discuss sustainability in the context of digital transformation. Eryn Devola, Head of Sustainability, Siemens Digital Industries, was joined by Greenforges, who design and develop sustainable underground farming systems, Energica Inside who are pioneering electrification in the mobility industry and Space Perspective, a human spaceflight company committed to changing people's view and perception of Earth.

The core takeaway that came out of the discussion was the importance of considering sustainability problems with a fresh perspective. Energica Inside discussed how it is taking its wealth of knowledge and expertise developed in the electric motorcycle industry and has found new ways to reuse and leverage that know-how.

Easton LaChappelle, co-founder and CEO, Unlimited Tomorrow, encourages attendees to "Use curiosity as a tool"

Systems are the future

In one of several sessions for invited media and industry analysts, Siemens leaders discussed how solutions are evolving to enable a systems-based approach to product development. As product complexity grows exponentially across all industries, radically better-connected multi-domain solutions and new methodologies are required. From the use of a systems-based approach at the Boeing Company to start-ups using a systems-based approach to revolutionize prosthetic limb development, systems-based engineering approaches are gaining not only acceptance and helping tackle growing complexity but driving the next generation of innovation.

Zel X – delivering personalized solutions

Siemens also took the opportunity to highlight how it is embracing the cloud to address new markets with a look at a new cloud-native service that has been in development for the past year. Zel X was created for small and midsize businesses who need an affordable and capable workshop management and execution platform. It brings together Siemens technology from in NX for 3D CAD geometry manipulation and CNC programming capability, data management and mastery of collaboration from Teamcenter in a process- and business-specific set of capabilities.

Summary

"Be the change" was the mantra at this year's Realive LIVE and across the presentations and break-out sessions, Siemens and its community of users and partners have explored not only how the industrial world is growing in complexity, but, more importantly, how we can leverage the best technologies and associated methodologies to address that complexity. From our initiatives in cloud-native and composable software architecture to deliver more personalized and adaptable solutions that are laser focused on business processes, to exploring how systems-based engineering approaches allow us to build smarter more connected products, faster and more sustainably than ever before.

▶▶ 64054 at www.ien.eu

Schaeffler Rear-wheel Steering System Goes Into Series Production

The mechatronic rear-wheel steering system enhances ride comfort, agility and safety. It is the world's first rear-wheel steering system with planetary roller gear based on Schaeffler precision mechanical engineering

The new mechatronic rear-wheel steering system from Schaeffler has celebrated its series-production premiere, bringing enhanced agility on bends and superior inner-city manoeuvrability to the new electric SUV of a renowned vehicle manufacturer. By adding steering functionality to the rear axle, Schaeffler's new technology improves handling in city traffic, enhances lane-change stability, and makes the vehicle easier to park.

"Schaeffler has developed from a supplier of components for chassis systems to a provider of complete steering systems," said Matthias Zink, CEO Automotive Technologies at Schaeffler AG. "We have built up extensive capabilities around steering systems in recent years because we see this as a strategic growth area for our business."

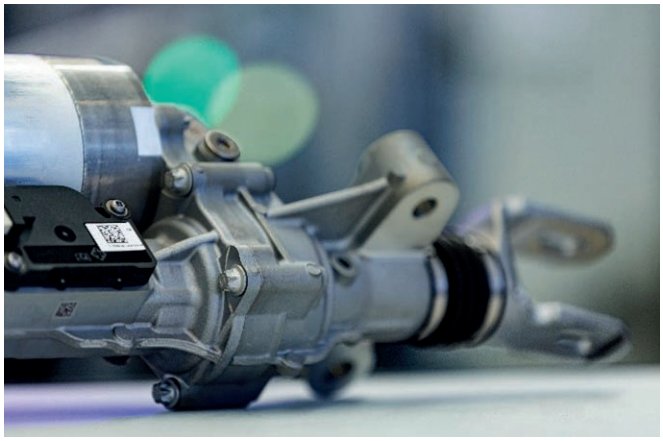
The key to Schaeffler's new rear-wheel steering system is the planetary roller gear – a world first based on precision mechanical engineering from the company's in-house industrial technology operations. The result is a highly compact system that is lightweight, quiet in operation, and optimised for easy vehicle integration. This innovative steering system has been well received by the market, with the first customer onboard and various other auto makers likewise committed to using it in their vehicles. In fact, further vehicle models featuring the steering system from Schaeffler are due to go into production before the end of 2023, as well as in 2024.

The new mechatronic rear-wheel steering system by Schaeffler has celebrated its series-production premiere, bringing enhanced agility on bends and superior inner-city maneuverability to the new electric SUV of a leading international car manufacturer

Ahead of the pack with an innovative planetary roller gear

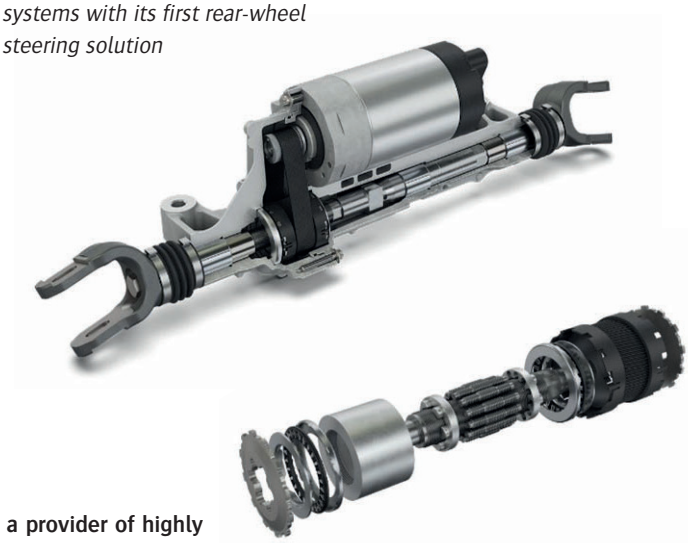
Schaeffler's rear-wheel steering system consists of two sub-assemblies. The first – and the key to it all – is a precision mechanical system featuring a planetary roller gear from the company's Industrial division that has been specifically adapted for automotive applications. The second is the powerpack, comprising the electronics, electric motor and software. Schaeffler develops the overall system and takes care of its integration into the customer's vehicles.

The planetary roller gear sets the Schaeffler system apart from rear-wheel steering systems made by other manufacturers, which traditionally use trapezoidal screw drives. Consequently, the Schaeffler product not only meets the stringent safety standards of Automotive Safety Integrity Level D (ASIL D), but it also yields significantly increased efficiency, reduced friction, and shorter system reaction times. This allows Schaeffler to generate precise, as well as safe, vehicle motion. This is especially advantageous for drivers of electric vehicles because it compensates for the downsides of the longer wheelbase necessitated by the underfloor battery position common in such vehicles. A longer wheelbase means a larger turning radius and hence reduced maneuverability. The Schaeffler rear-wheel steering system overcomes this problem in a number of ways. First, when the vehicle is changing lanes at higher speeds, the system turns the rear wheels in the same



Planetary roller gear: the technology innovation that sets the Schaeffler rear-wheel steering system apart from the rest

Schaeffler comes of age as a provider of mechatronic steering systems with its first rear-wheel steering solution



Planetary roller gear: the technology innovation that sets the Schaeffler rear-wheel steering system apart from the rest

steering direction as the front wheels, enhancing stability, handling and safety. Second, on tight bends, the system improves vehicle agility by turning the rear wheels in the opposite steering direction to the front wheels. This creates a virtual reduction in wheelbase, enabling the driver to steer through the bend with ease. In the same way, the system also reduces the vehicle's turning radius, making it much easier to maneuver, park, and make U-turns in tight inner-city spaces. And finally, the technology improves the active intervention capabilities of automated lane change assist systems.

Lighter, smaller, quieter

Other benefits of the new Schaeffler system include an improved steering feel as well as increased safety and ride comfort. "Thanks to its optimised inner design, our rear-wheel steering system is more compact and requires less installation space in the vehicle," said Clément Feltz, Head of Chassis business division at Schaeffler. "As a result, automakers can save up to 15 per cent in weight compared to alternative systems." In addition, the whole design of the system has been acoustically optimised, making today's ultra-quiet electric cars even quieter. The system – and its customers – also benefit from Schaeffler's longstanding excellence in precision mechanical engineering.

Schaeffler's journey as a provider of highly sophisticated chassis systems

Schaeffler can look back on many years as a supplier of individual chassis components – wheel bearings, strut bearings, spring cup bearings, universal joint bearings and the like – to the automotive industry. But in 2009, Schaeffler took a new direction when it started series production of its ball screw drive, a product that draws on the precision mechanical engineering know-how of the company's tool manufacturing department. Today, the ball screw drive is an integral part of many chassis systems, including electromechanical steering systems and brakes. This product was followed in 2015 by the series launch of the Schaeffler active roll control system. This was the company's first mechatronic ride comfort system, comprising precision mechanical components, an electric motor, and electronics. It was also the world's first chassis actuator to go into series production with variants for both 12V and 48V systems. Unlike passive anti-roll systems, the Schaeffler system reduces the roll angle, which markedly improves vehicle stability and ride comfort. And now, with the rear-wheel steering technology, there is another Schaeffler mechatronic chassis system on the road.

There is yet another Schaeffler chassis solution due to hit the market this year. The solution, the first electrohydraulic power steering system specially designed for front wheel steering in commercial vehicles, will be used in series production for a Chinese vehicle manufacturer. This system will initially support Level 2 automation and subsequently higher-level autonomous driving functions.

"Schaeffler first started out in the chassis systems market with precision mechanical components. Today, we are developing and manufacturing complete mechatronic chassis solutions of all kinds, ranging all the way to fully integrated rolling chassis concepts," said Clément Feltz. He heads a division of the company's automotive technologies business that will continue to be systematically developed into an integrator of chassis systems for large-scale automotive production and new forms of mobility. The company's first key components for steer-by-wire systems will go into large-scale automotive production midway through the current decade, with plans that complete, fully integrated steer-by-wire systems will follow.

▶▶ 64051 at www.ien.eu

Robot with igus Linear Guide Taps Beer in Seconds

One Two Beer GmbH develops automatic beer tap with hygienic, lubrication-free drylin linear technology

Festival season is in full swing. To keep the queues at the beer to reasonable lengths, One Two Beer GmbH has developed an automatic beer tap. Its core is a mobile tap head that moves to the bottom of the cup, which it fills in five seconds without foam-over – built with a lubrication-free, hygienic, durable lead screw from the igus dryspin series.

The goal of One Two Beer GmbH from Vienna is to spare concert-goers or any person going to a crowded event with annoying long queues before having a drink. Therefore, it has developed an automatic beer tap. Two plastic cups are placed side by side – much like a coffee machine. At the touch of a button, dispensing heads move to the bottom of each cup. The beer flows. Tapping from the bottom eliminates foam-over. The beer is tapped in just five seconds, so concert-goers don't have to wait long. Beer vendors enjoy machine support in times of labour shortages.

Hygienic, lubrication-free igus spindles allow for a refreshing and fast drink of beer.

No lubrication

As simple and ergonomic as the beer robot may appear, building it was a technical challenge. "For tapping in a matter of seconds, one necessary item was a fast linear guide with as little friction as possible," says Tamás Kozma, Chief Information Officer at One Two Beer GmbH. The system needed to work to within a tenth of a millimetre. It needed to be as compact as possible to allow quick transport. And it had to be insensitive to the harsh festival environment, which includes dust, high temperatures and condensation. "Since our machine works in the food sector, a 100% lubrication-free application with FDA conformity was also crucial for us." After a long search, the company's engineers finally came across igus, where they found a system that meets these requirements: a complete linear guide unit consisting of a compact dryspin-series lead screw and lead screw nut and a suitable stepper motor.

High-performance plastic and stainless steel allow hygienic, trouble-free dry operation

This is how the linear guide works: the tap is mounted on a flange lead screw nut from the dryspin JFRM series. When the NEMA 23 lead screw stepper motor rotates the lead screw, the tap moves up or down. The system looks simple, however there are some special features: the lead screw nut is made of FDA-compliant high-performance plastic, a self-lubricating material that allows for low-friction dry operation. The advantage is obvious: unlike lubricated versions made of metal, the polymer nut will not become a dirt magnet due to lubricating grease. It is easy to clean with water or high pressure. The linear guide is hygienic, and its mechanical system works flawlessly. The pairing of plastic and stainless steel also prevents corrosion. As there is no need for relubrication, there is also no necessity for any maintenance.

Lead screw efficiency of 82%

However, resistance to corrosion and dirt are not all that result in a long linear guide service life. igus has also enlarged the nut's thread edges by a factor of 1.3 for dryspin technology. The lead screw's thread pitch is also broader. Enlarged thread flanks mean more high-performance plastic for power transmission and thus more material that is tribologically optimised (that is, optimised for friction and wear). "This asymmetry has enabled us to extend service life to about 30% longer than that of symmetrical trapezoidal threads", says Hendricks, Head of dryspin Lead Screw Drive Business Unit at igus. The igus team have also flattened the flank angles of the lead screw nut and lead screw. "This gives us an efficiency of 82%, which is above average."

▶▶ 64036 at www.ien.eu

Yamaha to Show EV Battery Test Station and New Cobot at Motek 2023

Yamaha will hold a booth at Stand 7314, Hall 7, Motek 2023, October 10-13, to showcase new robots and automation solutions in action

The EV battery end-of-line demonstration featuring Yamaha's YK1200X SCARA places 35kg modules at high speed and sub-mm accuracy

Yamaha Robotics Factory Automation section will exhibit the battery end-of-line solution developed with system integrator JP Industrieanlagen alongside its advanced new 7-axis cobot at Motek 2023 in Stuttgart. Visitors can also see Yamaha's LCMR200 flexible transport modules in action, highlighting space-saving assembly automation with easy maintenance and traceability.

The EV-battery end-of-line solution will show lifting, moving and positioning 35kg battery modules for automated electrical testing and assembly. The demonstration highlights the 7.5m/s speed and 0.05mm positioning accuracy of Yamaha's YK1200X SCARA robot, which has 50kg payload capability and 1.2m arm length. The YK1200X positions each module in the test fixture, ensuring precise alignment with electrical connections. It then retrieves the tested modules using its long reach to install passed units directly in the battery pack and move others to a separate area. "As growing EV markets drive up demand for high-capacity, high-performance batteries, this solution developed with our integration partner shows how manufacturers can raise production output, lower costs, and increase productivity," commented Jumpei Ninomiya, Sales Manager for Yamaha's FA business in Europe.

The new cobot, with seven axes for enhanced dexterity, will demonstrate Yamaha's advanced human sense technology with force-sensing functionality. Its superior sensitivity enhances both human safety and performance by enabling accurate movement and positioning without needing to rely on machine vision.

The LCMR200 demonstration will highlight integrated track and trace, with continuous awareness of all slider positions to facilitate equipment maintenance, process control, and traceability. With the vertical circulation unit, the demonstration will show high-speed transport on two levels for space savings in addition to the agility that comes with the modules' electronically programmable speed, acceleration, and stop positions.

Jumpei Ninomiya added, "Our demonstrations show how Yamaha's industrial robots fit perfectly into modern smart manufacturing, bringing extra speed, efficiency, and flexibility to assembly and packaging activities throughout the factory."

Yamaha Robotics is at Stand 314, Hall 7, Motek 2023, at the Trade Fair Centre Stuttgart, October 10-13.

▶▶ 64049 at www.ien.eu

▲▲ 63405 at www.ien.eu

Designing and Proving Optics for Military Applications

In an interview with Rob Watkinson, Customer Support Manager at Resolve Optics, IEN Europe discussed key considerations when designing and supplying high quality fixed focus and zoom lenses to be deployed for military use in demanding battlefield environments

IEN Europe: Can you provide us with an overview of Resolve Optics' experience and expertise in designing optics for military applications?

Rob Watkinson: Producing a rugged lens optimised for military applications is a demanding task. However, drawing upon over 20 years of experience, our team of optical and mechanical engineers and designers have a proven track record in producing high quality military fixed focus and zoom lenses. Numerous customers have found sourcing a 'designed for purpose' lens from Resolve Optics has resulted in shorter lead time, lower cost, and a better overall product for their target military application.

What are the key challenges of designing optics for military applications?

Designing and producing a lens or optical system for military use requires careful consideration of its resistance to vibration, shock, temperature, and water ingress to ensure high reliability and top performance.

Designed for purpose optics deployed in an advanced military sensing system

For defence applications – the environmental demands can be much higher than for a typical commercial product. Our designed for purpose lenses have much higher life expectancy than regular commercial grade lenses would provide when exposed to the same demanding conditions.

To ensure lenses meet military grade specifications, requires that all environmental demands are not only carefully considered during the design phase but that they are also then qualified with physical testing.

Can you share with us some examples of Resolve Optics lenses and optical systems that are being used in military applications?

Most of our military customer applications are covered by non-disclosure agreements making it impossible to discuss specifics. However, speaking generically, I can tell you that we have supplied many Head-up Display (HUD) lenses into the military market. These lenses sit in the cockpit of an aircraft and record the pilot's view at the same time as capturing the graphics from their head up display. The challenge we had when designing a lens for this application was that each different aircraft would require a slightly different field of view. To produce a different fixed focus HUD lens for each type of plane would be

Head-Up Display lens for use in military aircraft

an expensive solution. Consequently, we produced a novel zoom lens design that would cover all the required fields of view. This enabled our HUD optics to be mounted in fixed positions to provide the correct FOV for almost any aircraft. This unique approach has enabled us to achieve economy of scale on a vast majority of the components in our HUD lens and therefore provide our customers with a much more cost-effective solution.

What benefits do your custom designed lenses offer to military product designers when an off-the-shelf optical component may be cheaper?

Because off-the-shelf lenses are typically produced in larger quantities than designed for purpose lenses they typically will be cheaper. However, the chances of you finding an off-the-shelf lens that meets all your operational and performance needs are often slim. For example, you may find a lens that suits your optical requirements but is not designed to withstand the environmental specifications or available space. Perhaps a specific custom mount is required. This is where you will see the benefit of a designed for purpose custom lens. When sourcing a designed for purpose custom lens, all considerations are considered from the design stage with an aim to provide a lens that meets all of your requirements without needing to make significant compromises. Another big advantage of a custom lens is security of supply. As you may be only one of a group of customers for an off-the-shelf lens you have little control over a manufacturer choosing to discontinue a critical optical component for your product. This will never happen with one of our custom lenses. As long as the customer keeps placing orders, we will keep supplying.

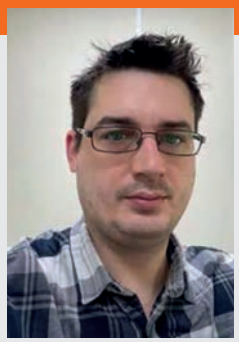
Can you describe the steps involved in the design process for military optics, from concept to production?

The design process for military optics typically starts with the contractor supplying us with a specification for their ideal lens. After reviewing this specification, and determining its feasibility, we then put forward a proposal for what we feel is the best solution for their application. Although we aim to produce a design that will cover every single one of the requirements, sometime the laws of physics will get in the way and non 'mission critical' compromises will have to be made. For this reason, regular communication with the customer is vital to ensure everything is clearly understood by all parties involved. Our aim is to provide a designed for purpose lens proposal within 1-2 weeks of receiving the initial enquiry. Once a final optomechanical design and operational specification is agreed upon, and an order placed, we move forward and finalise the design before proceeding to manufacture. The time scale for this can vary massively depending on the complexity of the design but for a relatively simple fixed focus lens would typically take around 5-6 months from point of order to delivery of the first lenses.

Specialist vibration / shock qualification testing equipment at Resolve Optics

To maintain a high-quality image when deployed in a battlefield environment what challenges must a lens or optical system overcome?

Again, our main concern here is that our lens can withstand the levels of vibration and shock that it may be exposed to. Without due care in the design of such lenses, the glass elements are likely to move which can severely affect its optical performance or even result in catastrophic failure. In most military scenarios – high reliability and maintenance of optical performance are critical.

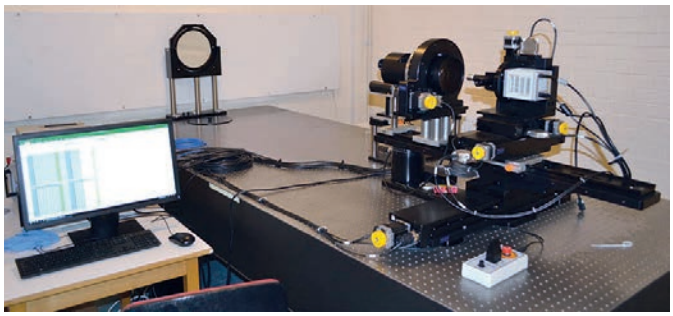


Rob Watkinson is Customer Support Manager at Resolve Optics. Rob's role is to ensure that business customers receive outstanding support, and all their needs are met. This may involve creating customer support policies and procedures for staff to adhere to, training and observing employees and answering customer queries.

He may be contacted on +44-1494-777100
or robwatkinson@resolveoptics.com

Robustness and reliability are very important to optical products that operate in a military environment. What testing facilities does Resolve Optics have to prove the suitability of its lenses and optical systems prior to deployment?

Resolve Optics has its own in-house testing facility for vibration and shock which allows us to provide ISO qualification for any of the lenses we produce. This vibration test facility enables us to not only qualify optics and optical assemblies with all the common forms of vibration testing, but also undertake specialist vibration/shock qualification tests in accordance with customer requirements.



MTF Testing system to automate and improve optical testing procedures

Even using the most advanced design and manufacturing techniques, lenses and optical systems can still vary in quality. What every military customer wants to know is that every lens we supply them meets or exceeds the agreed specification. Because of this customer requirement we invested in a state-of-the-art MTF Testing system to automate and improve testing procedures. For instance, when qualifying a lens to demonstrate that it meets its vibration/shock performance specification - an MTF test is conducted before and after the vibration test, this ensures that no elements were able to move during the vibration test and cause a change in optical performance.

How do you address issues related to ruggedness, environmental conditions, and shock/vibration resistance in military optical systems?

All of these considerations need to be considered from the start, the lens must be designed to withstand anything it will face in operation. By drawing on our many years of experience and utilizing tools available to us in our design software, we are able to produce a design that we are 100% confident will meet the specification. However, once the designed for purpose lenses are built, we again qualify them using our in-house vibration/shock and MTF facilities.

How does Resolve Optics stay up to date with the latest advancements in optical technologies to meet the evolving needs of military applications?

At Resolve Optics, we have been working with the defence industry for over two decades and understand the key features that contractors demand from their optical components and systems to ensure reliable and optimum performance. Key to keeping up to date is regular communication with existing customers and engaging generally with contractors serving the defence industry. As a specialist in custom optical design, we recognise that technology changes, and consequently is driven by our customers' changing needs.

What future trends do you foresee in the demand for optics for military applications?

Optical products are widely used by military forces for imaging, targeting, and surveillance applications. These optical systems are typically installed on military vehicles, aircraft, ships, and UAVs. Some trends we note are for improved target recognition, tracking mobile targets, surveillance, and imaging, over great distances and in adverse weather conditions. We are seeing a strong demand for ultra-wide-angle lenses to be used on unmanned vehicles such as drones.

▶▶ 63471 at www.ien.eu

ARENA SPORT LED DRIVER

With D4i Protocol for IoT Connectivity Integration

Delta announced the release of the EUCO-2.1kW LED drivers, the newest models of its EUCO Arena Sport Series with DALI 2/D4i and DMX/RDM versions. The new DALI model is certified with D4i standard, an extension of the DALI-2 lighting protocol, to meet demands on integrating IoT connectivity into LED sports lighting and other industrial and commercial lighting applications. The EUCO-2.1kW LED drivers consist of three programmable independent output channels with a max output power of 700 W/channel. The driver is capable of achieving a very low peak-to-peak current ripple (<1%), which allows high-resolution TV broadcasting of sports events. Energy conservation is also boosted by its 97% energy efficiency. In addition, it features a wide operating temperature (-40°C ~ 50°C) and achieve a rated IP66 to ensure a suitable operation for the most rugged environments applications. The drivers also offer a 200-meter remote control function. Traditionally, LED drivers are placed on high masts, making it difficult to setup, maintain and replace. With the remote control function that allows a 200- meter distance between the driver and the luminaire, the driver can be installed on the ground to support safe installation and easy maintenance.

▶▶ 64055 at www.ien.eu

EMBEDDED SYSTEM FOR RISC-V TECHNOLOGY

Integrates the MSRZFive system-in-package

The new FIVEberry embedded system from **ARIES Embedded** offers a smooth and fast start into computing projects. It integrates the powerful, OSM-compatible MSRZFive system-in-package (SiP) based on the single-core microprocessor RZ/Five by Renesas. The RZ/Five microprocessor has a RISC-V CPU core (AX45MP single) running at 1.0 GHz. The FIVEberry supports all necessary features to make the first steps with the RISC-V CPU core. The entry-level platform serves an expanded user community to develop and debug drivers and bootloaders, and even use it in prototype setups. The RZ/Five general-purpose microprocessor units (MPUs) from Renesas are built around a 64-bit RISC-V CPU core and employ the AX45MP from Andes Technology Corporation, based on the RISC-V CPU instruction set architecture (ISA). The peripheral functions of the small, low-cost FIVEberry include support for multiple interfaces, including 2 Gigabit Ethernet channels, 2 USB 2.0 channels, and 2 CAN channels. In addition, it offers dual A/D converter modules, making it ideal for applications such as entry-class social infrastructure gateway control and industrial gateway control.

▶▶ 64056 at www.ien.eu

SUSTAINABLE APPLIANCE CONNECTORS

Green Line products made from bio-based plastics

Sustainability is no longer a trend, but the order of the day. Wherever we can reduce our CO2 footprint, we should do so. The **SCHURTER** products presented are the 6100-3, 6100-4, 6102-3, 6102-5, 6600-3 and 6600-4, which are already established on the market, are IEC 60320 compatible appliance connectors which can now also be obtained made of bio-based plastics. "Green Line" is the product collection of SCHURTER components with the focus on reducing today's CO2 footprint and becoming less dependent on fossil raw materials. The environmentally friendly alternative to the fossil-based plastics that are widespread today are plastics that are made from plant-based raw materials. Plant based raw materials have a CO2-neutral footprint over the entire life cycle, which leads to a significant reduction in the CO2 emissions and thus of the products. In addition, bio-based plastics often have a lower density than fossil plastics, resulting in lower material consumption. Further products will soon follow with the already implemented IEC 60320 appliance connectors. SCHURTER will offer a complete family of products with a significantly reduced CO2 footprint.

▶▶ 64012 at www.ien.eu

SW Defined Vehicles and Flash

Advancements in flash memory supporting software-defined vehicles

Enter any vehicle service center and you'll likely see plenty of the tools you've always associated with fixing mechanical issues. But this is likely to change significantly in the coming years. With the growth in electric vehicles (EV), supported by government plans to reduce carbon emissions, service centers are more likely to need a laptop than a spanner. While moving the powertrain from fossil fuels to electric is perhaps the obvious visible change, along with interiors that more closely resemble a smartphone, the most significant upheaval is taking place to the electronics hidden inside.

As electronics replaced mechanical functions, the typical approach was to develop a dedicated electronic control unit (ECU). Over time, these became networked using technologies such as CAN, LIN, and FlexRay to optimize functionality, ease programming, and provide diagnostics. But this has led to complexity and a lack of flexibility in vehicle platforms. And, with a generation who grew up with the internet and smartphones now old enough to be vehicle owners, this rigid approach is diametrically opposed to what they are used to, user driven choice of functionality.

The automotive industry drags decades of electrical and electronic (E/E) architecture with it, making it challenging to move to a more flexible, software-based approach. Each function is carefully defined, built, and approved for use and cannot be exchanged for an alternative or have its features upgraded during its lifetime. ECUs are typically designed for use in a specific domain, such as powertrain, infotainment, body and comfort, or advanced driver assistance systems (ADAS).

Moving to domain, zonal, and central architectures

To ensure that new features can be offered to vehicle owners, it is clear that much of the cleverness needs to be implemented in the software. This moves automotive design towards that of smartphones, delivering a piece of hardware that can receive regular software updates and new software features. However, there is also a huge challenge in that the reliability of this software-defined vehicle approach must be retained, especially with respect to functional safety.

Currently, there are three different architectures under development. Those choosing a domain architecture are keeping functionality that belongs to a specific domain together, such as body and comfort. Multiple ECUs are, as far as possible, reduced to a single, large, and powerful ECU upon which

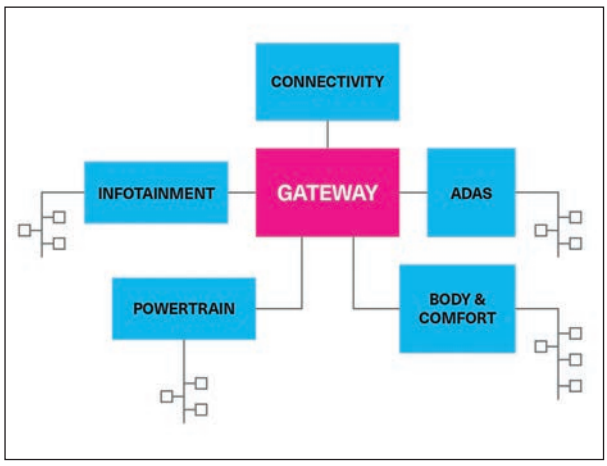


Figure 1: The domain architecture brings the classic domain functions together into powerful ECUs

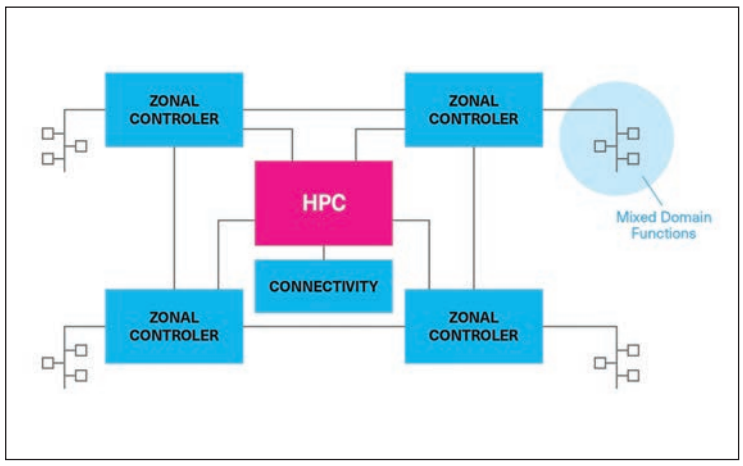


Figure 2: By contrast, the zonal architecture places the functions of differing domains into zonal controllers located where the function is implemented (e.g., rear for a backup camera)

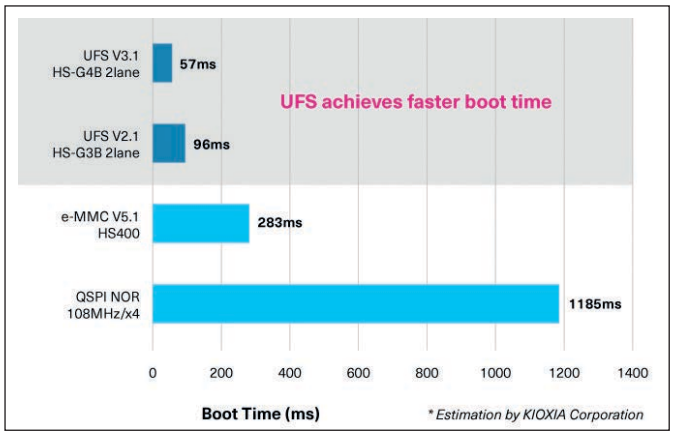


Figure 3: UFS offers significantly faster transfer speed than UFS, making for a faster boot time and more responsive embedded systems

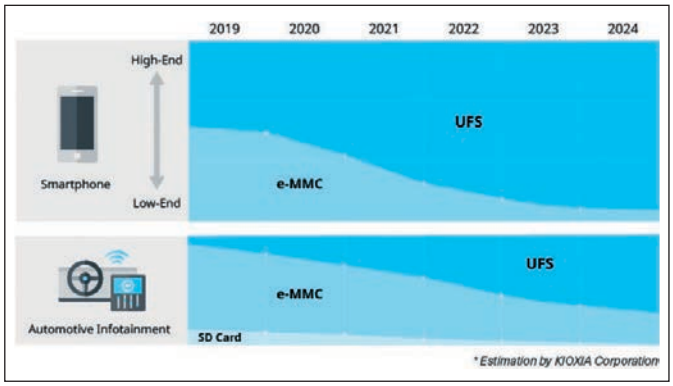


Figure 4: Automotive is transitioning from e-MMC to UFS, following the trend in consumer applications like smartphones

the functions are implemented in software. These are networked with a gateway ECU that provides internet access to support over-the-air (OTA) updates (Figure 1).

The second approach, a zonal architecture, is, in many ways, more pragmatic. The large, powerful ECUs are placed in each quarter of the vehicle, close to where the functionality is needed. For example, in a rear quarter, the domain controller could be responsible for the light cluster, rear-facing cameras, parking sensors, and electric drive for the trunk door. Each controller has multiple functions (lighting, door opener) implemented in software, linked using automotive Ethernet. Overall control is provided by a central high-performance computer (HPC) linked to a gateway (Figure 2).

Finally, there is the central approach, something used by those automakers pushing hard to deliver fully autonomous vehicles. HPCs are central to this path and, without the baggage of legacy systems to hold them back, it provides total software flexibility.

Challenges around flash storage

Regardless of the E/E architecture approach taken, the flash memory storage used for code, diagnostics, and other data must be suited to the application and its lifetime in the vehicle. Today, the domain architecture hardware in development should be released to the market in 2025. However, the hardware decisions for these platforms were made several years ago, which is reflected in the technology used.

For example, while the smartphone industry has largely moved to UFS flash, the automotive industry is still transitioning from e-MMC. For telematics and ADAS, manufacturers are already using the largest capacities available, such as the THGAMVT0T43BAB8 128 GB memory based upon KIOXIA's BiCS FLASH™ 3D flash memory technology. However, these systems are predicted to require up to 1 TB in the next generation of vehicles.

It is doubtful that the JEDEC standard for e-MMC will be developed further, leaving it at its maximum transfer rate of 400 MB/s compared to 2320 MB/s for UFS 3.1 devices (Figure 3). Use of UFS 3.1 and subsequent revisions, such as UFS 4.0, will also see the move away from 2D toward automotive-capable 3D flash. KIOXIA leads the way in this technology as key member of the JEDEC team, defining and contributing to the standard.

Furthermore, by developing its own controller hardware and firmware alongside the flash, it is possible to add capabilities that enhance write performance (WriteBooster) and improve random read accesses (Host Performance Booster). So, as the automotive industry requires more from flash memory, and because density and performance are tightly coupled, the solution will lie with a switch to UFS.

There are proposals to leverage the power of the cloud to support vehicles with some of the new innovations being proposed. However, this and other safety features depend on cellular networks, such as vehicle-to-vehicle (V2V) and vehicle-to-X (V2X) communication. Despite the increased deployment of wireless internet connectivity in new vehicles, much of this future functionality requires broad accessibility to 5G networks that aren't yet fully deployed. This means that much of the technology that will underpin vehicle safety and autonomous driving features will have to be performed inside the ECU at the edge.

In order to execute algorithms quickly and store results, the additional bandwidth that UFS managed flash offers will be critical to these applications. Additionally, e-MMC memories will not attain the capacities of UFS devices. Finally, UFS is a technology that will continue to evolve and develop, as will the storage solutions that utilize it. While e-MMC is not obsolete, like any semiconductor technology, the viability of older processes diminishes with time. In automotive, where longevity of supply is a crucial requirement, this will be a challenge unless the move to UFS is made (Figure 4).

Flash memory choice remains a critical design decision

The world of automotive is changing, and that change is rapid as vehicle owners look for an ownership experience closer to that of a smartphone. For the automotive industry, it is clear that the E/E architectures of the past won't support this requirement. In fact, they would benefit by moving to hardware that largely remains fixed for many years and can be deployed across a range of vehicles, relying on software to define the functionality implemented.

With domain, zonal, and central architectures under development, flash memory choice is a critical piece of the puzzle to enable the software-defined vehicle. The semiconductor industry's players, like KIOXIA, are continuously pushing the boundaries to deliver the higher capacities and throughputs required by such applications. Looking ahead, the trend in automotive will be to continue replacing e-MMC with UFS, providing five-times higher throughput, capacities that break the 1 TB barrier, leading to the transition from 2D to 3D flash.

▶▶ 64052 at www.ien.eu

Precision Power Testing Supports Development of Next generation Drivetrains

In this case study we develop how Yokogawa's Test & Measurement Division highly accurate power analysis ensures that ATESTEO, an automotive-specialist independent testing services provider, provides reliable results for automotive customers

In the automotive world, the pace of development of new drivetrain technologies is as fast as it has ever been. It is possible to look forward to the day when the traditional petrol- or diesel-fueled combustion engine will no longer be produced. Its demise will be the result of government regulations aimed at reducing carbon emissions from the transportation sector: electrification is the new watchword for the car industry.

This is leading manufacturers of passenger cars and commercial vehicles to ramp up investment in the development of new electric motor technologies: both hybrid electric and fully electric drivetrains, and the multitude of systems and components which support them.

At the heart of the development, testing and validation work which is taking place globally in the vehicle sector is ATESTEO, an automotive-specialist independent testing services provider which has more than 800 employees operating more than 170 test benches across nine locations in Germany, USA, China and Japan.

ATESTEO provides a wide range of drivetrain testing services, including noise, vibration and harshness (NVH) measurements and environmental simulation, as well as tests of an entire vehicle on a dynamometer or on the road.

The measurement results which ATESTEO reports to car and automotive systems manufacturers steer the progress of development of the drivetrains which will be embedded in the next generation of faster, more efficient, and more dynamically effective vehicles. The accuracy, stability and traceability of these measurements are of critical importance to ATESTEO's customers – and that means ATESTEO makes exhaustive and detailed evaluations of test instruments before deploying them in its test benches.

The Challenge - Background

An independent provider of testing services and engineering consultancy to automotive manufacturers, ATESTEO has achieved success by maintaining a high level of agility and responsiveness to customer demands. These customers range from suppliers of specialist components for the powertrain or transmission, right up to the world's leading car manufacturers.

So the test benches which ATESTEO maintains need to be flexible enough to cope with a wide variety of test specifications and set-ups. In addition, the growth of the company has taken it into new markets which can take advantage of its expertise in drivetrain testing, such as marine systems and renewable energy generation.

A typical parameter which the customer needs to measure is the efficiency of an electric drivetrain, or of its components. Here, precise and accurate measurements of the input voltage and current are essential.

Yokogawa WT1800E power analyzer

Compared to the actual traction power of the motor, these measurements allow the manufacturer to measure power losses, locate their cause, and take measures to reduce or eliminate them to increase system efficiency.

But this is just one of many types of measurement which ATESTEO might be called on to make. Every customer and every new test project is different, and requires a fresh test set-up.

The Challenge

So ATESTEO's business model calls for the flexibility to adapt its more than 170 test benches to every new project. At the same time, automotive customers require very high accuracy and traceability: the measurements which ATESTEO provides are intended to validate the performance and reliability of a design, and so it is crucial that the customer has very high confidence in the measurement results.

The Solution - Application requirements

The ATESTEO test benches include facilities for advanced power measurements. ATESTEO serves many customers from across the global automotive sector, as well as manufacturers of marine and renewable energy equipment. Every customer project has its own test specification, so ATESTEO is continually tearing down the test set-ups of completed projects and reconfiguring test equipment and software for new projects.

This means it requires flexible test instrumentation which can readily be repurposed for each new project. At the same time, ATESTEO is liable for the accuracy of its measurements, so needs to use test instruments which provide traceability for the validation of measurement outputs.

Measurement solution

At its drivetrain test center in Kassel, Germany, ATESTEO has built its platform for advanced power measurements on the WT1800E power analyzer from Yokogawa. It also deploys a DL950 scopecorder. These instruments are backed by engineering support provided directly by Yokogawa. ATESTEO's choice of Yokogawa instruments meets its requirement for flexibility and accuracy:

- The WT1800E is a modular test platform which offers up to six input channels, as well as a wide range of display and analysis features, and PC connectivity. Engineers can use the WT1800E to make simultaneous measurements on up to six inputs at a rate of 2 MS/s; all current and voltage measurement inputs are synchronized. A mechanical channel can acquire either analog or pulsed signals.
- The high-resolution 8.4" XGA display allows splitscreen viewing of up to six waveforms. This makes it ideal for efficiency tests of inverter

Yokogawa DL950 ScopeCorder

driven motors, renewable energy technologies and traction applications. The unit can display measurements in vector format or trending in time.

- The WT1800E guarantees power accuracy of 0.05% of reading plus 0.05% of range. It is capable of harmonics analysis up to the 500th order of a 50/60 Hz fundamental frequency. The built-in motor evaluation capability means that it can measure more than just electrical parameters: measurement of rotation speed and direction, torque, mechanical power, synchronous speed, slip, electrical angle, motor efficiency and total system efficiency can be derived from the analog or pulse outputs of rotation and torque sensors.
- ATESTEO follows a regular 12-month calibration cycle for the WT1800E and DL950 at Yokogawa's ISO/ IEC17025 accredited (RvA K164) European Standards Laboratory in Amersfoort, The Netherlands. This enables ATESTEO to maintain full traceability of its measurements, and validates the results which it supplies to its customers.

Results - Precision testing helps automotive customers innovate with confidence

The move to electrify the drivetrain of vehicles has prompted the automotive industry to embark on a huge innovation effort. From traction systems to transmissions to energy storage, car manufacturers are responding to the demand from road users for vehicles which allay range anxiety and which provide superior dynamic performance.

ATESTEO's test benches provide manufacturers with critical data points to enable them to experiment with new design approaches, validate their success, and implement them with confidence in production units. And the Yokogawa equipment on which ATESTEO relies provides the ideal platform for the production of accurate, reliable and traceable power measurements.

WT1800E Power Analyzer

The WT1800E high performance power analyzer is the ideal tool for accurately measuring power, its quality and efficiency:

- Accuracy: The WT1800E guarantees a power accuracy of 0.05% of reading plus 0.05% of range and is capable of harmonics analysis up to the 500th order of a 50/60 Hz fundamental frequency.
- Reliability: High stability ensures that precision measurements can be made reliably with the WT1800E today and over the long term.
- Flexibility: With up to six input channels, a wide range of display and analysis features, and PC connectivity, the WT1800E is the measurement solution for a broad range of power efficiency and harmonic analysis requirements.

DL950 ScopeCorder

The DL950 ScopeCorder captures and analyzes a wide variety of electrical, physical sensor signals and serial buses. It offers a combination of high sampling rates for a detailed view, and long recording times to monitor trends over time.

- Insight: The DL950 measures signals at high resolution, and secures data in the harshest environments with superior noise immunity and isolation technology.
- Versatility: The eight available slots can be equipped with a selection of over 20 types of input modules, to combine measurements of electrical signals, mechanical performance parameters, and decoded vehicle serial bus signals.
- Usability: A menu simplifies the pre-measurement set-up of various applications. A large touchscreen provides for ease of use and visibility.

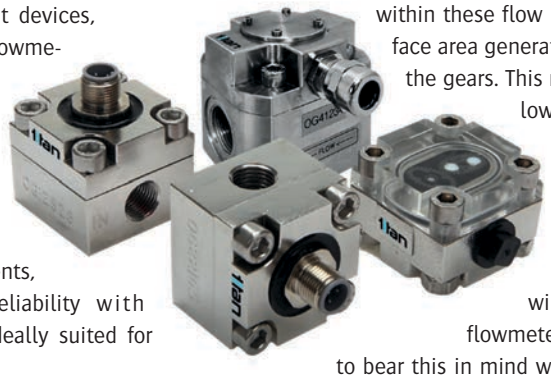
Andreas Olf, Branch Manager at ATESTEO's Kassel facility, says: 'ATESTEO's success is in large part due to the expertise we have developed in the testing of drivetrains – we are the leading specialists in this field of technology, and customers benefit from the knowledge and flexibility we provide. Underpinning our service is our confidence that the measurement values that we supply to customers for efficiency, power output, NVH and the rest are true and accurate. That is why we choose to use Yokogawa products for power analysis. Over many years of operation, we can see the results from the Yokogawa equipment are stable, accurate and reliable, and so we have no hesitation in continuing to rely on the WT1800E and DL950.'

▶▶ 64047 at www.ien.eu

Oval Gear Flow Meters for Metering High Pressure

These devices enable flow measurement of high viscosity liquids in demanding applications such as chemical and petrochemical industry

Positive Displacement flow measurement devices, such as Titan Enterprises' Oval Gear (OG) flowmeters, are one of the most widely used types of flow meter for measuring the flow of petroleum liquids and petrochemical additive injection fluids. They remain a solid choice for many applications in today's modern process control environment, due to the OG's suitability in harsh environments, high-pressure capability, and long-term reliability with minimum maintenance. They are also ideally suited for viscous fluids.



High viscosity liquids, such as fuels, thick oils, bitumen, resin and tar, require devices that are precision engineered to provide highly accurate flow measurement. The teeth in an oval gear meter are used to drive the gear and seal the central path, with the differential force being developed by the shape of the ovals rather than the gear teeth on the lobe. Oval Gears vary in size and shape depending on the resolution and flow requirement of the process application.

The pressure drop is essentially the limiting factor when it comes to metering high viscosity liquids within an application. The Oval Gears within these flow measurement devices provide a larger surface area generating a much greater driving pressure across the gears. This results in a wider flow range capability and lower pressure drop (see graph below) compared to other positive displacement meter types.

Neil Hannay, Titan Enterprises' Senior Development Engineer, says: "The higher the viscosity of a liquid, the more pressure will be required to 'force' the liquid into the flowmeter and around the oval gears. It's important to bear this in mind when selecting the correct size of oval gear flowmeter for your application. For example, more pressure will be required to push through resin than diesel."

Metering high viscosity liquids

Almost immune from the effects of varying liquid viscosity, density and temperature, the measurement accuracy of Titans' Oval Gear (OG) flowmeters improves as liquid viscosity increases, from a nominal 1% to around 0.1% of flow rate at higher viscosities. Titan's standard OG models provide high accuracy up to 1000 cSt; for viscosities above 1000 cSt Titan's specially profiled gears are supplied to facilitate additional flow of the liquid.

Titan Enterprises offer special options and adaptive designs of its Oval Gear meters to meet specific high-pressure requirements, aid chemical compatibility, and ensure safe operation in potentially explosive atmospheres. Titan's Oval Gear range of meters include ATEX compliant IP65/NEMA 4 protection models, and devices that offer intrinsically safe options for processes that operate within harsh environmental conditions, such as explosive or corrosive atmospheres, where flowmeters are required to withstand tough environments whilst maintaining accurate and reliable measurement.

Titan's Oval Gear meters can be pressure tested in-house up to 950 bar for custom-designed models and calibrated against diesel upon request. In the chemical industry, oval gear flowmeters are often used in conjunction with a batch controller to allow for the automatic dispensing of pre-set volumes of chemicals.

▶▶ 63936 at www.ien.eu

New Flagship Model of Secure Cellular Routers with All-round Data Protection

Moxa Introduces OnCell G4302-LTE4 to its OnCell Series of next-generation secure cellular routers to Bolster Network Security of Critical Infrastructure

Moxa Inc. introduced a new flagship model, OnCell G4302-LTE4, to its OnCell Series of next-generation secure cellular routers. The advanced-level secure cellular routers have new security software that complies with IEC 62443-4-2 standards, improving performance and speeding up vulnerability fixes. Also, their alignment with global wireless approvals enables secure communication for different industrial applications.

The 2022 Industrial Cybersecurity Report by Micro Trend stated cyberattacks had affected 89% of organizations in the manufacturing, electric, and oil and gas industries. Among these industries, the oil and gas sector suffered the most significant financial damages, with an average cost of around USD 2.8 million. These findings highlight the pressing need for robust cybersecurity measures and protocols to safeguard critical infrastructure and protect against financial losses. For example, the famous ransomware attack on Colonial Pipeline in 2021, a turbulent history of cybersecurity and the largest on oil infrastructure in the U.S., shows the importance of strong cybersecurity defenses in OT environments to protect critical operations from cyberattacks.

"Moxa is devoted to developing a comprehensive networking solution with built-in security features for our customers. The OnCell G4300 Series, with its rugged design and industry certificates, ensures Moxa customers' critical systems remain running, and the cellular secure routers always stay at the forefront, protecting Industrial IoT applications from cyberthreats," said Li Peng, head of Moxa Industrial Network Security Business.

The OnCell G4302-LTE4 integrates MXsecurity software, providing centralized security and network management functions to configure and monitor devices remotely. Real-time alerts and notifications help enterprises quickly identify and troubleshoot issues. IEC 62443-2 compliance and advanced features like Secure Boot, Virtual Private Network (VPN) and Network Address Translations (NAT) protect data and networks from cyberthreats.

With built-in WAN redundancy and GuaranaLink technology, the OnCell G4302-LTE4 helps recover connection quickly, reducing downtime and minimizing interruptions to operations.

Offering industrial-grade reliability, the OnCell G4302-LTE4's rugged hardware is suitable for hazardous locations and has CCCEx, IECEx, ATEX, and Class 1 Division 2 certifications. Its wide temperature ranges from -30°C to +70°C ensures reliability, even in harsh environments. Furthermore, the OnCell G4302-LTE4 also has the EN50121-4, NEMA TS2, and E-mark E1 certifications to meet the needs of vertical applications.

Advanced Network Security Based on the IEC 62443-2 Standard for Uninterrupted Connections and Comprehensive Data Protection

The OnCell G4302-LTE4 comes with GuaranLink support for continuous and reliable cellular connectivity. It restores cellular connections before these issues lead to complete network failure.

With the ability to connect via WAN, the WAN Redundancy function detects any loss of WAN connection. It seamlessly switches to the cellular interface when the Ethernet interface is down and automatically switches back when it recovers.
Furthermore, Secure Boot, a built-in security mechanism, ensures edge computers boot only from a validated and authorized bootloader and operating system.
All these features ensure the comprehensive protection of cellular routers from most types of threats. However, updates of the OnCell G4302-LTE4 security features will continue to stay ahead of the curve and fend off cyberattacks.

Secure Cellular Routers With Network Management Software Make Things Easier

The OnCell G4302-LTE4 secure cellular routers, alongside the MXsecurity industrial security management software, provide real-time visibility of cyberthreats with alerts and event notifications. The map view of the status of all cellular routers allows users to monitor distributed devices at a glance, enabling actionable management for better detection and reaction against cyberthreats.
Connecting every device through MRC Quick Link, users can remotely access devices quickly, reducing maintenance costs, and saving time. It helps OT and IT managers arrange resources accordingly for those cellular routers in unmanaged areas. The OnCell G4302-LTE4 not only builds up a security shield for network protection but also supports enterprises by managing all devices globally.
To experience the newest OnCell G4302-LTE4, users can contact Moxa's regional office to join an early-bird program that runs from August 2023 to March 2024. The program has limited openings and will be available on a first come, first served basis.

OnCell G4302-LTE4 Highlights

- Global cellular bands support for the Europe, Australia, the U.S., Japan, and Asia-Pacific
- Certification approvals by NEMA TS2, E-Mark E1, EN 50121-4, CID2, ATEX, CCCEx and IECEx
- IEC 62443-4-2 based design for the cybersecurity protection with Secure Boot and future software feature updates
- Built-in central management software supported by MXview One, MXconfig, MXsecurity, MRC Quick Link
- Uninterrupted connection technology supported by GuaranLink and WAN redundancy
- Industrial-grade hardware design for harsh environments with -30 to 70°C wide operating temperature

▸▸ 64053 at www.ien.eu

National Insider Threat Awareness Month 2023: Bystander Engagement

National Insider Threat Awareness Month (NITAM) will take place throughout the month of September. The ITPMO will be hosting various panels as a hybrid via MS Teams and in-person at DOE Headquarters-Forrestal Building each Wednesday in September

Established in 2019 by the United States National Counterintelligence and Security Center (NCSC) and the National Insider Threat Task Force (NITTF), the annual, month-long campaign aims to educate government agencies, private sector organizations, and the public on the risks posed by insider threats and to promote the development and implementation of effective Insider Threat Programs. This year, NITAM spotlights "bystander engagement" as its theme, underscoring the vital role individuals play in identifying and responding to concerning behaviors.

Carl D'Halluin, CTO of Datadobi, Steve Santamaria, CEO of Folio Photonics, and Seth Blank, CTO of Valimail have offered the following thoughts on this critical topic:

Carl D'Halluin, CTO, Datadobi

"Insider threats lurk within the very heart of organizations, disguised as trusted employees, partners, or collaborators. These individuals, armed with access privileges, possess the potential to wreak havoc that is often unseen until it's too late. Their actions can shatter the security foundation of a company, leading to catastrophic data breaches, financial ruin through fraud, and irreparable damage to reputation.

First held in 2019, National Insider Threat Awareness Month (NITAM) is an annual campaign spanning the month of September that reminds us that mitigating insider threats demands a comprehensive strategy encompassing diverse countermeasures. This can entail the enforcement of stringent access controls, leveraging user behavior analytics, and the implementation of data loss prevention solutions, as well as vigilant user activity monitoring, and the fostering of anonymous whistleblower reporting mechanisms. However, to truly take insider threat mitigation to the next level, a solution that empowers organizations to assess, organize, and take action on their data is pivotal.

By proactively assessing data, it allows for the identification of anomalies and vulnerabilities before they escalate into significant risks. The continuous monitoring and analysis of data enable the rapid detection of unusual patterns or behaviors, facilitating timely intervention and mitigation. Moreover, the organized structuring of data enhances visibility, making it easier to pinpoint sensitive information and recognize unauthorized access or movement. When potential threats are identified, the solution enables organizations to take swift and precise actions, such as restricting access, initiating investigations, and/or moving data to another location, minimizing the potential damage. Beyond immediate responses, the solution's adaptability ensures that countermeasures remain effective in the face of evolving insider tactics. This approach not only reduces the impact of insider threats but also contributes to operational continuity and regulatory compliance. Ultimately, the ability to harness data-driven insights enhances an organization's proactive stance, equipping it to navigate the intricate landscape of insider threats with vigilance and resilience."

Steve Santamaria, CEO, Folio Photonics

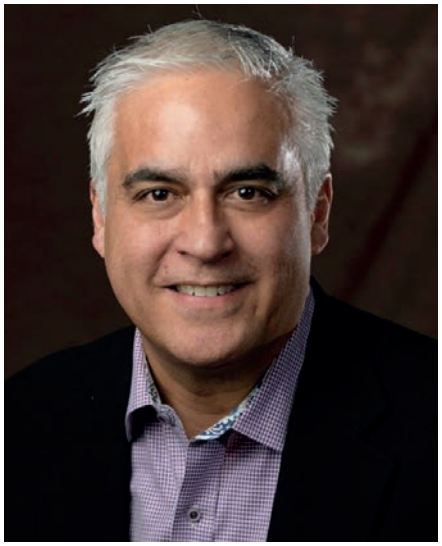
"In a world where data fuels progress, the importance of National Insider Threat Awareness Month (NITAM) cannot be overstated. The campaign, which takes place each year in September, highlights the stark reality that employees, strategic partners, and other insiders with authorized access can inadvertently or intentionally inflict significant damage. This threat transcends industries, affecting both government entities and private businesses, as trust and access intersect in today's interconnected digital landscape.

However, NITAM extends beyond simply shedding light on the issue—it drives us to seek effective mitigations, such as an active archive, which is an advanced technology designed to provide efficient and secure data storage while enabling quick access and retrieval of information. Unlike traditional archival systems that store data in a passive, offline state, an active archive maintains data in a more accessible and readily available form, making it easier to search, retrieve, and analyze. However, within the context of insider threats, an immutable active archive serves as a robust defense due to its unique qualities.

By ensuring data immutability, it maintains the integrity of stored information and creates a traceable record of interactions. This traceability acts as a deterrent against malicious insider actions and aids forensic analysis during security breaches. Moreover, its alignment with regulatory compliance standards ensures adherence to legal requirements. Last but not least, real-time monitoring capabilities can further enhance its effectiveness by promptly identifying unauthorized activities.

In closing, NITAM stands as an annual rallying cry—a time to renew our commitment to

Carl D'Halluin, CTO, Datadobi



Steve Santamaria, CEO, Folio Photonics

Seth Blank, CTO, Valimail

cybersecurity and acknowledge that, while trust is invaluable, preparedness is non-negotiable."

Seth Blank, CTO, Valimail

"In today's fast-evolving and intricate digital communication framework, DMARC (Domain-based Message Authentication, Reporting, and Conformance) acts as a pivotal element. It serves as a critical component that prevents external actors from exploiting a trusted name to deceive and mislead. Think of DMARC as the equivalent of a bouncer checking IDs at an exclusive nightclub. Its primary role is to ensure that only authorized individuals—essentially those on the guest list—can gain entry. DMARC's primary function is to make certain that unauthorized entities are both easily detectable and unable to impersonate your employees or executives, which if left unaddressed can turn an external threat into an internal one.

However, the role of DMARC extends beyond mere prevention. With DMARC enforcement, organizations gain the clarity that their communications are secured from impostors. Yet, this clarity also brings to light another dimension of security – the risks that potentially lurk within the organization itself. While it's imperative to fortify against external threats, an equally significant aspect of security is the continuous oversight of internal activities and behaviors.

Understanding the intricate interplay between trust, security, and the myriad channels of communication means recognizing the phased nature of protection strategies. Tools like DMARC offer the first line of defense against external hackers and other attackers. However, once these external defenses are robustly established, it becomes critical for organizations to pivot, channel resources, and focus on addressing the subtleties and complexities of internal threats. This sequential layered approach ensures a holistic defense strategy – begin by fortifying against external threats and then work meticulously to foster and maintain a trustworthy internal environment."

▶▶ 64050 at www.ien.eu

COTS Solution for Aerospace Engineers

Helps rapidly optimize missile fin actuation system

Precise missile fin control can be the difference between hitting or missing the target. Fin actuation depends on a motion solution with reliable, high dynamic control, in a power-dense package. A customisable off-the-shelf (COTS) strategy can help achieve this outcome, minimising development time while meeting the essential operational criteria.

To achieve precision within metres of the missile's expected impact point, precise fin control is fundamental. While the guidance system controls the trajectory, the performance of the motion solution, comprising the motor and feedback control, is crucial to achieve accurate and responsive missile fin position. The capability to actuate fins to the precise angle, rapidly reacting to continual feedback, is essential to achieve target precision.

Missile fin actuation demands a motion control system that can generate sufficient torque to move the position against aerodynamic forces, including velocity up to several times the speed of sound. However, mass and physical volume are critical constraints, both in terms of the aircraft's overall payload when considering air-launched missiles, as well as the flight performance characteristics of the missile itself.

Precise missile fin control is fundamental for achieving precision within the radius of the missile's expected impact point

High dynamic control

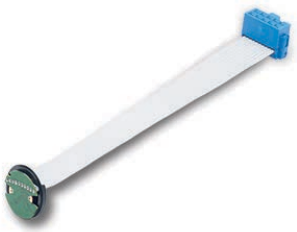
Brushless DC motors, also known as BLDC, are the preferred design, and a primary reason is their inherent power density. The absence of brushes can be combined with a slotless design that enables greater concentration of windings, boosting torque for the form factor. Increasing to four motor poles, rather than two, also maintains the same low mass and dimensions, but optimises torque. As a result, motor designs like the Portescap 30ECT Ultra EC™ can increase power output of the system by 20% for the given envelope. The 30ECT90 can generate up to 225mNm maximum continuous torque, as well as the peak torque required for high dynamic operation; it can also sustain 2 seconds peak torque creating 2.4Nm.

High dynamic performance is essential to enable virtual real time fin control to maintain precise trajectory from situational feedback. Contributing to rapid acceleration, low inertia is achieved through the slotless design thanks to its lighter rotor, improving the dynamic response. A slotless motor also reduces cogging torque, providing the smooth motion delivery essential to optimise control. The BLDC motor's electronic commutation is also vital to this process, and the 30ECT Ultra EC motors integrate Hall sensors to provide rotor position feedback, as well as motor control including speed and torque.

Reliability is crucial

Considering the imperative for precision, ensuring fin actuation reliability is equally critical. Highly robust motor construction is essential, providing resistance to shock and vibration. Constructed from stainless steel,

Portescap's 30ECT Ultra EC motor features laser welded front flanges for additional durability



M Sense B magnetic encoder provides a high degree of accuracy

the 30ECT motors feature laser welded front flanges for additional durability. The motors can also operate across a wide temperature range, from -55°C to 85°C. The motor design optimises thermal behaviour in repetitive cycles with high peak load, typical to the requirement for a fin's frequent positional changes.

While the BLDC's characteristics minimise losses in friction while improving thermal regulation, the slotless attributes minimise eddy currents that also contribute to heat generation. Reducing eddy currents also minimises electronic noise, where ensuring electromagnetic compatibility, alongside avionics and electronics devices, is imperative. Moreover, the slotless design decreases the prospect of concentrated magnetic flux densities that can generate noise interference.

COTS strategy advantages

Considering the stakes of missile fin actuation, a bespoke motion control approach is an option. However, time is the major constraint in design from scratch, where tooling development alone might take more than a year. Instead, a customisable off-the-shelf (COTS) solution is a practical strategy that combines a tailored design with fast delivery.

An international defence manufacturer engaged Portescap to provide a missile fin control actuation system based on this approach. Portescap's ability to customise a COTS solution to facilitate a quick prototype, combined with experience in aerospace and defence projects, were key drivers in selecting the solution partner.

The 30ECT brushless DC motor and an M-Sense encoder were integrated into the design to maintain the small envelope and increase power output. The robust motor design met the environmental demands of the application, and careful material selection allowed the motor components to extend the 20-year storage life requirement.

Flexible engineering options

Portescap's engineering team can also offer customisation, such as different coils to match speed and voltage requirements, as well as various shaft lengths and connectors. Along with a choice of gearbox, encoder and feedback control options, engineers can provide mechanical design integration, such as housings and flanges, to suit.

Missile fin actuation is a highly specialised pursuit, but by engaging in a COTS approach, aerospace and defence engineering teams can quickly achieve a high-performance, cost-effective, motion solution.

▶▶ 64033 at www.ien.eu

ROBOTIC AUTOMATION PLUG & PLAY SYSTEM

Tezmaksan presents CubeBOX for machine tending

CubeBOX is a robotic automation plug & play system for machine tending which was developed by **Tezmaksan** R&D team. CubeBOX increases the production efficiency by providing key advantages in terms of time and cost. It minimizes the need of operator in machine tending and allows no interruption in production. Thanks to this device, up to 50% increase in efficiency can be achieved, especially during nights shifts. With its standard structure, CubeBOX is compatible to all new or used CNC machines and CNC control units with no brand, type, or model restriction. It is approximately 20% cheaper than the company-customized robotic integration systems and can be commissioned in just one day. CubeBOX is presented with the free of charge software developed by Tezmaksan R&D team named RoboCAM. With RoboCAM the job/part change can be done by any operator who even knows very little about robot programming. CubeBOX, which also has the pallet changing option, can load and unload the workpieces to the machine(s) with its robotic arm and the operator can simultaneously load and unload the workpieces from or to the storage area. CubeBOX is portable and can be moved easily from one CNC machine to the others in factory.

▶▶ 64002 at www.ien.eu

INTELLIGENT IOT I/O GATEWAYS

WISE-EdgeLink and Analog, digital or relay I/O

Advantech announced the availability of its ADAM-6700 WISE-EdgeLink series. Adam-6700 is an IoT I/O gateway with comprehensive functions including on-board I/O support and RS-485/Ethernet interface. It is an all-in-one device that not only integrates OT and IT data, but also saves cost, space, and engineering effort with the help of WISE-EdgeLink gateway software. The Adam-6700 is quick to setup and configure and includes built-in IoT Gateway Software - WISE-EdgeLink, as well as no-code WISE-EdgeLink software. It is lightweight, cross-platform, and has edge-computing middleware. It is a good hub for connectivity, protocol conversion, data logger, alarms and open API. Moreover, it enables seamless integration to multiple cloud platforms and 3rd party systems, and lastly runs on common OS such as Linux and Windows. Using an Advantech Adam-6700 features a Multiple On-board IoT I/O Gateway allowing users to collect Assets and OT Data with wired and wireless connectivity. Customers can access the IoT Academy to discover the full potential of the Advantech ADAM-6700 Intelligent IoT I/O Gateways.

▶▶ 64048 at www.ien.eu

THERMAL IMAGING IR LENS ASSEMBLIES

For use in FT-IR spectroscopy, CO2 laser and more

Resolve Optics is a leading supplier of custom lens assemblies including high-performance Infrared (IR) optics for use in thermal imaging, FT-IR spectroscopy, CO2 laser and defence applications. The company delivers thousands of custom lens assemblies per year - from complex high-speed imaging lenses, and material sorting inspection optics, to radiation resistant lenses for critical space and nuclear applications. Using substrates including germanium, sapphire, silicon or zinc selenide, Resolve Optics is experienced in developing and supplying IR lens assemblies with anti-reflection coatings to optimise performance in the infrared waveband to best suit your application. Mark Pontin - Managing Director of Resolve Optics commented "While some optical design and manufacture companies promise low cost and high quality, few can match the innovative optical design and expert technical support that Resolve Optics is internationally renowned for. We have successfully developed many innovative and custom optical assemblies for our industry partners over the last 25+ years. We welcome the OEM design and manufacture opportunity to develop, design or manufacture special lenses and optical products".

▶▶ 63935 at www.ien.eu

BILGE ALARM SENSOR

For use in bilges of marine vehicles

Hizmar's Bilge alarm sensor BS 03-S is used to keep the liquid level under control or to give alarm when it reaches a certain level. This alarm sensor is designed to use in bilges of marine vehicles such as boats / yatchs. It also can be used in places such as a zone, room, well or elevator shaft to get warning when water reaches the required level. With its protective grille, it is not affected by dirt or substances that may be contained in the water. Bilge Alarm Sensor BS03 has TürkLoydu type approval certificate and is suitable for use in classified marine vessels. Manual lift is realised to test mechanism for no hassle field tests. Its tank fiiting type is screw mounting via Chrome Bracket. The body material is made of chrome with a diameter of 80 mm and a body length of 130 mm. The operating voltage is from 0 to 50 Volt AC/DC with a currency of 100 mA. It operates in tempratures from 0 to +45°C. Last, it reaches IP68 protection class.

▶▶ 64011 at www.ien.eu

ENERGY MONITORING TOOL

For industrial audits in plant utilities

VPInstruments releases VPVision Mobile, the complete energy monitoring system VPVision but now in a sturdy explorer case. It enables auditors to offer their customers a complete audit of plant utilities. VPVision Mobile can be used for on-site data logging with remote access, thanks to built-in cellular connectivity. This gives the option to check the system remotely, saving time and money. By monitoring plant utilities like compressed air, industrial gases, steam, water, and electricity, the user can provide customers with factual system and performance data. Areas can be pinpointed to save energy and money and reveal opportunities to the production capacity. VPVision Mobile enables to offer customers a complete audit of their plant system. Meanwhile it is also possible to show them the benefits of permanent monitoring, such as continuous energy savings and optimizations. VPVision Mobile comes in a sturdy explorer case. Making it withstand the most challenging industrial conditions. Companion 1m/3.2ft. and 10m/32.8ft. cables and Modbus T-splitters offer an easy plugand-play setup.

▶▶ 64015 at www.ien.eu

CRYOGENIC SAMPLE STORAGE TUBES

Maintains high sample integrity

Ziath reports how its 2ml CryzoTraq™ 2-ECT storage tube maintains high sample integrity by minimising the chance of cross-contamination as their externally threaded design eliminates the possibility of sample encountering the screw thread. Cryogenic storage is widely used in laboratories to preserve valuable samples in vapour phase liquid nitrogen, a method that requires special products that can tolerate low temperatures without compromising the samples.Affordably priced, CryzoTraq™ 2-ECT tubes are made from non-cytotoxic and non-mutagenic plastic resins and are certified Human DNA, DNase/RNase/Pyrogen and ATP/PCR Inhibitor free, sterile to SAL 10-6 and compliant with IATA PI 650 for safe transport by air. While CryzoTraq™ 2-ECT tubes are designed to safely store samples down to -195C they may also be used at general cold-storage temperatures. CryzoTraq™ 2-ECT tubes have screw-style closures that ensure their externally threaded caps stay on despite temperature and air pressure changes that occur during sample thawing. Skirted bottoms on CryzoTraq™ 2-ECT tubes allow them to stand up unaided on your laboratory workbench.

▶▶ 64058 at www.ien.eu

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