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IEN Europe

INDUSTRIAL ENGINEERING NEWS

Smarter, Safer, and More Sustainable Industrial Processes

IEN Europe interviewed Nicolas Jacquet, Director of Product Marketing for Aventics portfolio to learn more on Emerson's ecosystem of solutions and how they can be of help to the overall performance of industrial processes.
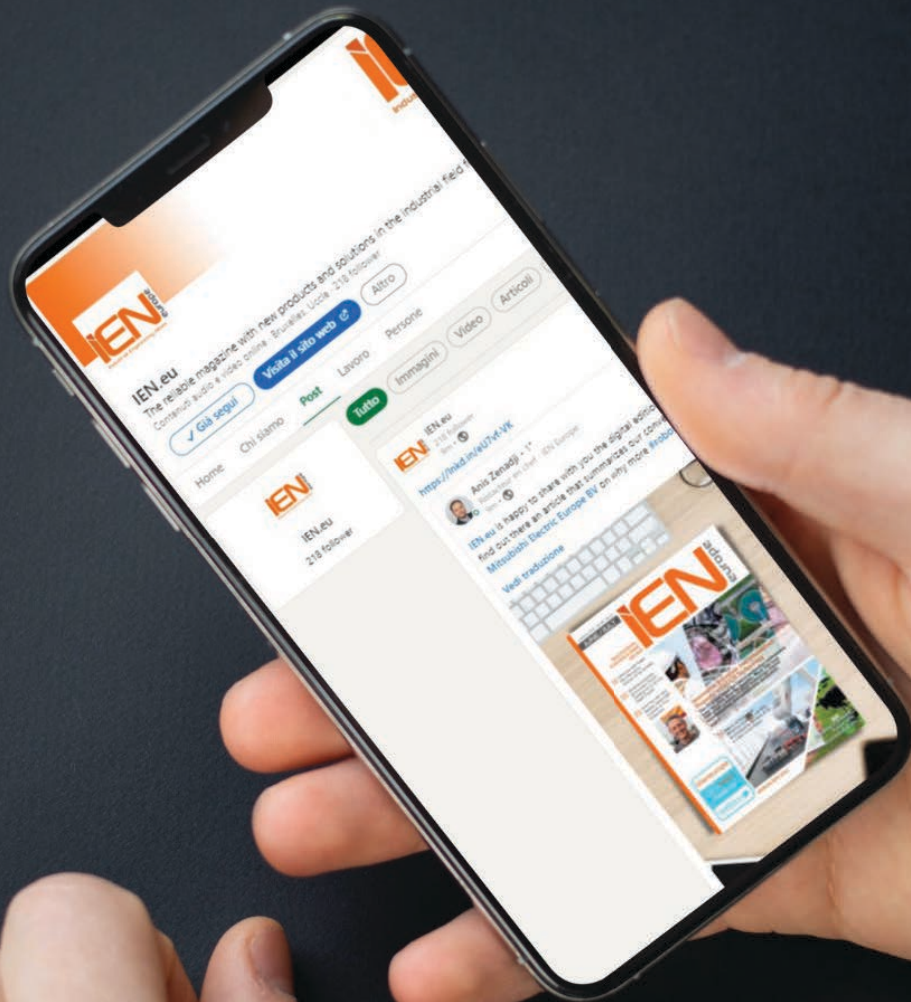
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Dear Readers,

This summer issue concludes a rich first semester of 2023 that has seen industrial fairs coming back progressively to an interesting level in terms of number of attendees as well as for the quality of the meetings offered. IEN Europe recently followed LiveWorx 2023 and will soon provide you news on further global events.

In addition, you will find an interesting interview with Nicolas Jacquet, Director of Product Marketing for Aventics portfolio. The aim is to discover or learn more about this ecosystem of solutions that gives a hand to the overall performance of industrial processes.

Through the Energy Efficiency section there is a contribution from Analog Devices that brings us to the CO_2 reduction in the industrial sector. Consumers today are looking for lower carbon products and services. Governments around the world are increasing regulations to reduce carbon emissions to meet their net zero greenhouse gas emissions targets. Navigating the path to net zero may create new opportunities for industrial manufacturing companies to embrace new technologies to accelerate lower carbon manufacturing.

We wish you a pleasant and interesting reading.

Editor for IEN Europe

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Alan Lee new ADI Chief Technology Officer

Analog Devices announced the appointment of Alan Lee to the position of Chief Technology Officer (CTO). He and his team will collaborate closely with ADI customers, universities, research organizations, and other strategic partners to incubate novel technologies and develop the eco-systems to support their market entry. Formerly with AMD, Alan served as its Head of Research and Advanced Development. While there, his teams developed novel hardware, software, artificial intelligence, and high-performance computing technologies and were responsible for many innovations and patents over the past decade. Alan is a well-known industry leader, currently chairing both the CTO Committee for the Semiconductor Industry Association (SIA) and the CTO Council for the Global Semiconductor Alliance (GSA). He has served on the Board of Directors for the Semiconductor Research Corporation and the Board of Trustees for the NSF Institute for Pure and Applied Mathematics. Alan will report directly to ADI's CEO and replaces ADI's former CTO, Dan Leibholz, who now serves as ADI's Senior Vice President, Digital Business Unit.

Rockwell Automation extends its partnership with AB Market to cover Azerbaijan and Turkmenistan

Rockwell Automation has extended its successful partnership with AB Market to serve Azerbaijan and Turkmenistan. AB Market is a value-add distributor in Rockwell Automation PartnerNetwork™ ecosystem that currently serves Türkiye and will set up a legal entity in the two new regions. The partnership extension will also benefit from the close cultural ties between Azerbaijan, Turkmenistan, and Türkiye, with countries with similar values, languages, and business mindsets. There is significant growth in the process industries of Azerbaijan and Turkmenistan, with investment coming into the region from overseas to manufacture products locally. This growth will require modern automation products and services to ensure it operates efficiently and competes with imports. Rockwell Automation and AB Market want to ensure that they can support their international customers investing in these countries and create new opportunities for global and local organizations investing in the region.

Kollmorgen and OTTO Motors Initiate Strategic Technical Collaboration

Kollmorgen and OTTO Motors announced their new strategic technical collaboration. Kollmorgen and OTTO Motors share a common goal to deliver self-driving vehicle applications to OEMs and System Integrators that strive to streamline material handling to end-users in all industries globally. Together, the two leaders are exploring their joint capabilities to provide innovative solutions for their growing combined customer base. With over fifteen years of robotics experience and 4+ million production hours, OTTO Motors' autonomous mobile robots (AMRs) reliably deliver safety, productivity and large-scale deployments to the world's most recognized brands, including GE and Toyota. Kollmorgen has delivered vehicle automation solutions for automated guided vehicles (AGVs) and mobile robots with its NDC Platform for over fifty years, and has through the industry's leading eco system of OEM and System Integrator partners deployed tens of thousands of advanced self-driving vehicles for a variety of applications globally, making Kollmorgen NDC the industry benchmark.
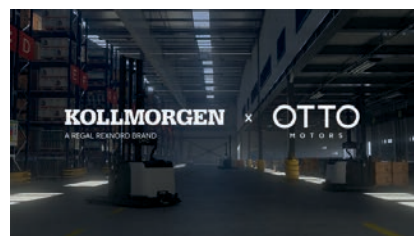
Hammond Power Solutions Appoints Chief Executive Officer

Hammond Power Solutions Inc. (HPS) announced the appointment of Adrian Thomas as the Company's next Chief Executive Officer, replacing Bill Hammond who will assume the position of Executive Chairman after 22 years as the CEO. Mr. Thomas will also be appointed to HPS' Board of Directors. The announcement follows an extensive search process conducted by the Board of Directors which included the evaluation of highly qualified internal and external candidates and was aided with the support of an executive search firm. Adrian is a highly experienced professional with over 20 years of expertise in the electrical and automation industry. Throughout his career, he has held key positions at renowned companies such as General Electric (GE), TMEIC, and most recently Schneider Electric. Adrian's experience has included a number of senior executive roles in Canada at both GE and Schneider Electric, where he has consistently demonstrated exceptional leadership and a deep understanding of the industry.

Takeaways from PTC LiveWorx 2023

Taking place in the Boston Convention Center from May 15 to 18, IEN Europe went to the PTC's signature event that highlighted the latest innovations in digital transformation for industrial companies.

With 10,000+ in-person and virtual attendees, 70+ tech demonstrations, 320+ session, trainings, breakouts, and a great concert from country music star Dierks Bentley, LiveWorx 2023 came with promising expectations that did not disappoint us.

The entire PTC ecosystem came out for the event, showcasing how PTC and its partners are supporting customers to design better products, manufacture more efficiently, and deliver superior service.

Here are some of the key themes and ideas that bubbled to the top of conversation throughout the event.

### Closing the loop with digital thread

On the Xtropolis show floor, there were showcases of the digital thread in action through customer examples, like Vestas and Volvo Group.

One of the demonstrations showed how Volvo Group is adding value to their core products with the foundation of a model-based digital thread. As safety is a core value and differentiator to Volvo, one of the applications they've developed is a mobile app to guide first responders in an emergency. Some of their larger commercial vehicles have high voltage areas and other safety concerns that could put responders at risk. They created an augmented reality app to show safety personnel how to safely approach the truck. Because of their powerful digital thread, which has a digital definition of components, they've been able to create a library of 1,500 different variations of that truck delivered in the app.

Sustainability is good for the planet and good for business

To support customers in their sustainability efforts, PTC is expanding relationships with Ansys and aPriori. Ansys Granta for materials management will be integrated into PTC products to assist with more sustainable product design and improve traceability. aPriori will complement Ansys Granta by offering insights on manufacturability, costs, and carbon footprint.

PTC announced its own commitment to the Science Based Targets initiative, which calls for a 50% reduction in emissions by 2030 and a net zero emissions goal by 2050.
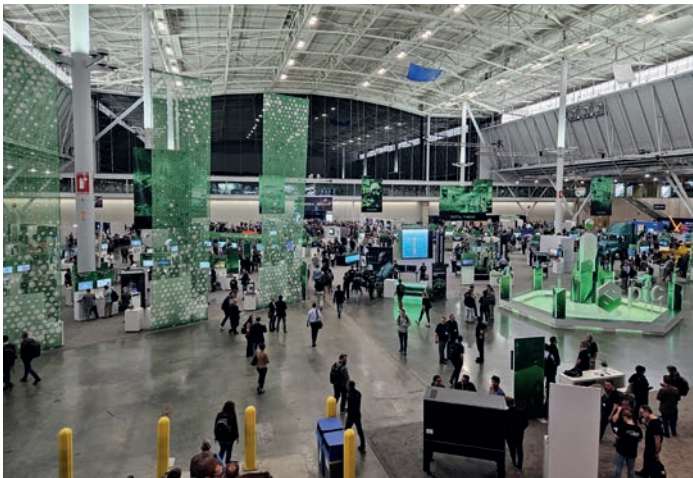
Agile: Design hardware like software

More companies than ever before are using Agile methodologies to design and manufacture products. What was once primarily a software initiative is now making its way to hardware development, in part because of the availability of cloud-based tools to support the process. Agile is a project management strategy that breaks down large projects into shorter "sprints" with set goals and objectives. At LiveWorx, one of the foremost experts in the field, MIT Professor Steven Eppinger, gave what could be described as Agile 101 for Product Design. He outlined why it's happening now, why it's worthwhile, and the adjustments that need to be made to make it work effectively for hardware. Eppinger discussed making Agile work for hardware often requires certain adjustments. You can't do Agile exactly like it's done in software, but you can adapt the key principles to get similar benefits.

PTC's cloud-native and SaaS products, like Onshape, Arena, and Codebeamer, pair well with Agile processes and in businesses where speed is a priority and teams may be distributed.

Embracing SaaS

Creo+, the latest core product to be delivered as SaaS (among other benefits), debuted at LiveWorx alongside the major enhancements available in Creo 10. Windchill+ and Kepware+ were launched last year.

The benefits of SaaS were woven into many of the presentations, with real-time collaboration, lower cost of ownership, and enhanced cybersecurity frequently mentioned.

Debunking 5 Myths about Digital Twins

Frances Sneddon, Chief Technology Officer at Simul8 debunks five of the most common misconceptions about digital twins to help you get the most out of them and understand how they can enhance your current approach to building a simulation.

Digital twins, if a business hasn't already implemented one, is at least talking about it. However, as with any new buzzword, there are many and varied definitions and opinions as to how these technologies should best be implemented.

Myth 1 – Digital twins are an enterprise deployment only, meaning huge implementation
This is a widely misunderstood perception of this technology that can put a lot of smaller organizations or individual departments off exploring the benefits of digital twins. The truth is that they can be built, using simulation, in days, not months, meaning that this technology can be made accessible regardless of a company's size.

Myth 2 – A real time data source is enough to keep a digital twin up to date
What is more important than real time data, is the understanding of the process that needs to stay up to date. As you continue on your simulation journey, it's pivotal that you revisit how things may have changed so that you can make adjustments to ensure you are getting the best possible outcomes for your unique challenges.

Myth 3 – Digital twins need a real time data stream to be valuable
In reality, a digital twin only has to be fed with data at the pace and interval that decisions are made. This could be in real time, it could be once a week, or it could be as often as you need. It's important to understand what your objective is and then make an informed decision on how regularly your digital twin needs to be updated.

Myth 4 – Digital twins need to reflect an entire company
While it is possible to have a digital twin reflect an entire organization, this is not the best place to start. Organizations should start small with simulations for individual processes and build up from there. This way they can build simulations far more quickly and start seeing results immediately. The linked processes can then be connected together at a later date if this is desirable.

Myth 5 – Digital twins are only real time replicas
Where would the value be in that?! A real digital twin can not only look at what is happening now, but also at what has occurred in the past and, most importantly, it can help inform you as to what to do next. This will enable businesses to make better decisions, using the results of past projects.

Conclusion
The idea of creating a digital twin can sometimes be overwhelming, as many assume that they are a huge undertaking, both in terms of cost and time. But they don't have to be. While having a twin run alongside a live system does offer the opportunity for continuous, real-time assessment, it is perhaps more useful to think of this as an opportunity to offer assessment on demand, as that is a more typical use.

When used in conjunction with simulation, digital twins can truly transform decision making and add value, without the data having to be 100% perfect. As organizations become more adept at creating focused specific digital twins, they will quickly begin to see the value of de-risking decision making by modelling scenarios in a virtual world before committing real world resources.

Frances Sneddon,
Chief Technology Officer, Simul8

Smarter, Safer, and More Sustainable Industrial Processes

IEN Europe interviewed Nicolas Jacquet, Director of Product Marketing for Aventics portfolio to learn more on Emerson's ecosystem of solutions and how they can be of help to the overall performance of industrial processes.

What is your definition of Discrete Automation? Can you briefly present your portfolio of ASCO™, AVENTICS™, Branson™, Movicon™, PACEdge and PACSystems™ solutions?

Discrete Automation is about the technology bricks that enable discrete manufacturing processes. Our portfolio comprises of: First, intelligent devices that create motion or generate data on the floor (sensors, pneumatic systems, fluid control devices): Asco, Aventics; Second, controls to implement, execute and optimize discrete processes: PACSystems, PACEdge; Last, software to provide a scalable IIoT environment to build applications, visualize the machine and processes, and transform data into information: Movicon.

At Emerson, our teams around the world help factories to produce the goods that make everyday lives possible in a smarter, safer, more sustainable way.

Does this portfolio may constitute a whole ecosystem for your partners or are you planning to add new solutions?

Our portfolio forms an ecosystem within which our engineers and customers collaborate to find solutions to their toughest problems. This is not a one size fits it all approach. Our customers' needs are changing all the time, and so do our solutions: We are continuously launching new products and renewing our expertise to better serve our markets. For example, we launched a new range of electric actuator last year. We also have very existing product releases, from floor to cloud, coming in 2024.

What should a potential partner look for to continuously improve their operations in their digital transformation journey? How do you leverage technology and innovation to improve operational efficiency and productivity for your customers?

It starts with data. We help our partners to use intelligent devices to get measures from the field and software to visualize them. Once aligned on which metrics we seek to impact, we can work together to identify valuable insights and architect the right solution. There is this trap of picking a technology first and then just be looking for applications. But our floor to cloud approach is about having a deep understanding of our customers' issues first, charting an effective path to ROI second, and then building the right solution with our technology stack.

Nicolas Jacquet, Director of Product Marketing for Aventics

How do you ensure seamless integration and compatibility with existing automation systems or infrastructure within a customer's organization?

Today, compatibility is the bare minimum - our products use industry standard protocols. What we aim for is interoperability, so that our solutions work seamlessly at the customer without human intervention. Doing so requires two things: intelligence at device level, and knowledge of the customer application. So, in the end, achieving integration is not just about connecting devices. It is also about connecting the folks who run operational technology with the folks who run information technology.

What efforts does Emerson support in terms of sustainability and environmental responsibility?

We started this journey a few years ago. Emerson Discrete Automation

in Europe reduced its operational CO_2 emissions (scope 1 and 2) by 30% between 2018 and 2022. This is only the beginning: We are committing to reach net zero operations by 2030. Among other things, we have been actively using our own portfolio to achieve this result. Our intelligent devices on the floor generate data by measuring W.A.G.E.S (water, Air, Gases, Electricity and Steam). This data feeds directly into MOVICON Industrial Analytics Software that we use for energy monitoring and decision making. It is all about generating insights. Like our customer, we need to do more with less – Real time accurate information allows us to minimize our environmental impact.

When it comes to automation and the gathering of all important data into a single platform or device, what efforts have been made in regards with cybersecurity?

This is a key concern of ours, Safety is a core value at Emerson. Cybersecurity threat assessment and mitigation is a mandatory step of our New Product Development process. Additionally, we collaborate actively with our suppliers to protect our customers from zero-days vulnerabilities. Moving forward, building the digital factory requires new skill sets. Cybersecurity has emerged as a key competency required for Discrete Automation and has become an integral part of our engineering team.

Could you share some examples of successful projects where Emerson Automation's solutions have made a significant impact on the performance of industrial processes?

We worked with a leading tire manufacturer to identify energy saving opportunity. Monitoring compressed air consumption revealed that leakage was a major waste within one of their factories: 10% of their energy bills was for compressed air leaks. Our team implemented compressed air dashboards and identification methods to detect leaks and repair them before they cause major energy issues. We are helping this customer to deploy this solution on other sites, helping them to generate significant energy savings at a global level while progressing on their net zero targets.

Are there any notable research and development initiatives or future product developments that Emerson Automation is currently working on?

One of our top priorities is helping our customers to reach their sustainability goals. Many of our customers have undertaken the long journey of reaching net zero emissions, and they need a partner to accompany them. This is the kind of critical missions that excites us! We already have solutions across all our product categories that can contribute to those goals and this is a key focus for every new product we develop.

This is related to another key initiative: Connecting Islands of Automation. So much data is generated at machine level but stays trapped there, and ultimately is unused. Empowering discrete manufacturer to access this data and transform it into insights remains on of the fastest way to effectively reduce scrap and increase OEE (Overall Equipment Effectiveness).

Last, could you provide some insights into Emerson Automation's long-term vision and strategic goals for the future?

The factory of the future will be depopulated. We are only at the very beginning of a significant demographic shift not only in Europe, but also in North America and China. Recruiting and retaining talent will be particularly challenging for operations, supply chain and engineering. Our floor to cloud approach will continue to evolve to help our customers to deal with the industry skill shortage we foresee. This means that our solutions will need more onboard intelligence so to offer more flexibility for the end-users and self-optimize.

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CC-Link IE TSN Adds Value to Additive Manufacturing Operations

In recent years, additive manufacturing (AM), or "3D printing", has quickly opened up new production frontiers. Structures once regarded as being impossible to fabricate with traditional machining techniques have become commonplace.

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. These are commonly used in applications that can be as demanding as jet engine turbine blades. 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. Parts must meet stringent specifications and quality standards while being produced to meet aggressive schedules and cost targets. 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 manner 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, the world's first open industrial Ethernet 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
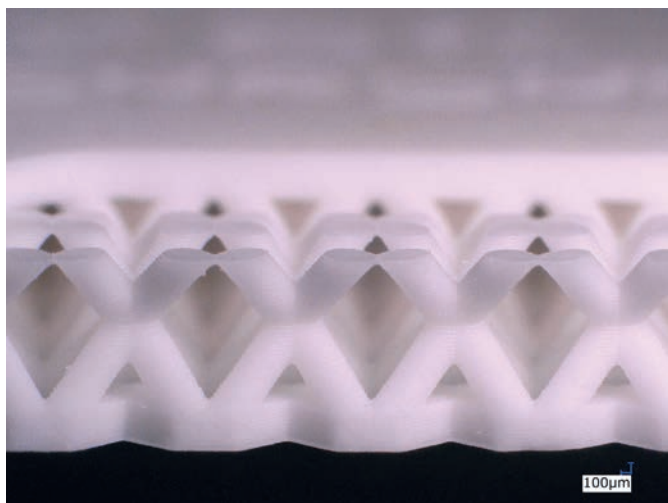
number of key benefits.

The convergence of different network traffic on the same architecture allowed the complex, multi axis, high precision motion control system 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 simpli-

fied, 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 allowed a conventional industrial PC to be integrated into the setup without the need for dedicated hardware, further simplifying the machine and helping to reduce cost. This 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.

The end result was an extremely productive AM machine that provided Shashin Kagaku a significant lead over its competition in what is already a highly competitive marketplace. More importantly, its customers also benefit from a significant increase in productivity in the form of an even more cost-effective tool.

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."

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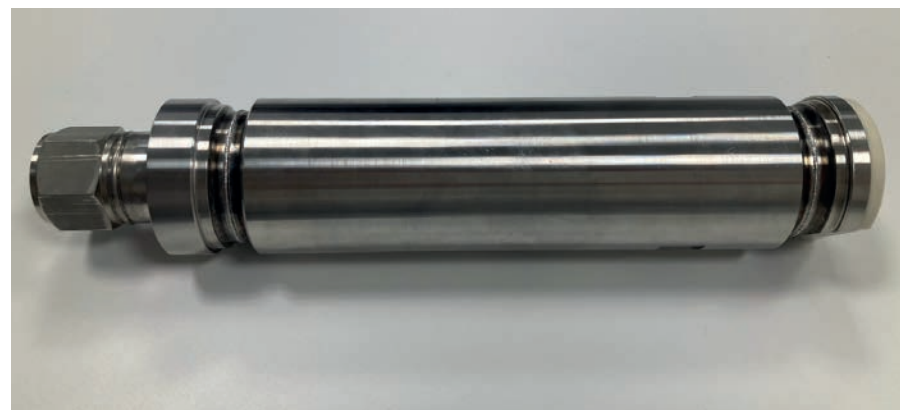# Successful Deep-Sea Observation of Sea Level Fluctuations with Silicon Resonant Water Pressure Gauge

Adopted for use in N-net, contributing to mitigation of disaster damage

The Japan National Research Institute for Earth Science and Disaster Resilience (NIED), the Earthquake Research Institute (ERI) belonging to the University of Tokyo, and Yokogawa Electric Corporation (Yokogawa) have undertaken evaluation of an innovative water pressure gauge for use in the early detection of tsunami. The water pressure gauge used in this evaluation was equipped with a new type of silicon resonant pressure sensor*1, and was installed on the seafloor near the Boso Peninsula at a water depth of 3,436 m. In this evaluation, the gauge successfully identified pressure fluctuations of seven hectopascals that are equivalent to a 7-cm change in sea level. Although it is difficult to obtain data on tsunamis, which are infrequent events, the evaluation allowed the detection of changes in sea level similar to those of a tsunami, and the water pressure gauge is expected to be used in the event of an actual tsunami. The water pressure gauge will be adopted for the Nankai Trough Seafloor Observation Network for Earthquakes and

Free-fall pop-up type ocean bottom device equipped with the new water pressure gauge used for the evaluation on the seafloor

Tsunamis (N-net) to observe water pressure fluctuations on the seafloor caused by tsunamis generated by earthquakes, enabling reliable detection of tsunamis and contributing to damage mitigation.

Details of N-net, the newly developed water pressure gauge, and its evaluation will be presented at the Japan Geoscience Union Meeting 2023 that will be held from May 21 to 26, 2023.

Details

NIED, ERI, and Yokogawa have evaluated the effectiveness of a water pressure gauge equipped with a MEMS*2 silicon resonant pressure sensor for use as a seafloor pressure observation device that enables the acquisi-

A water pressure gauge equipped with a silicon resonant pressure sensor that uses MEMS technology. Length 261.5 mm.

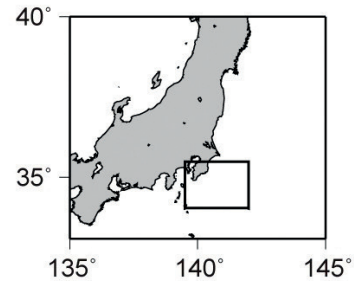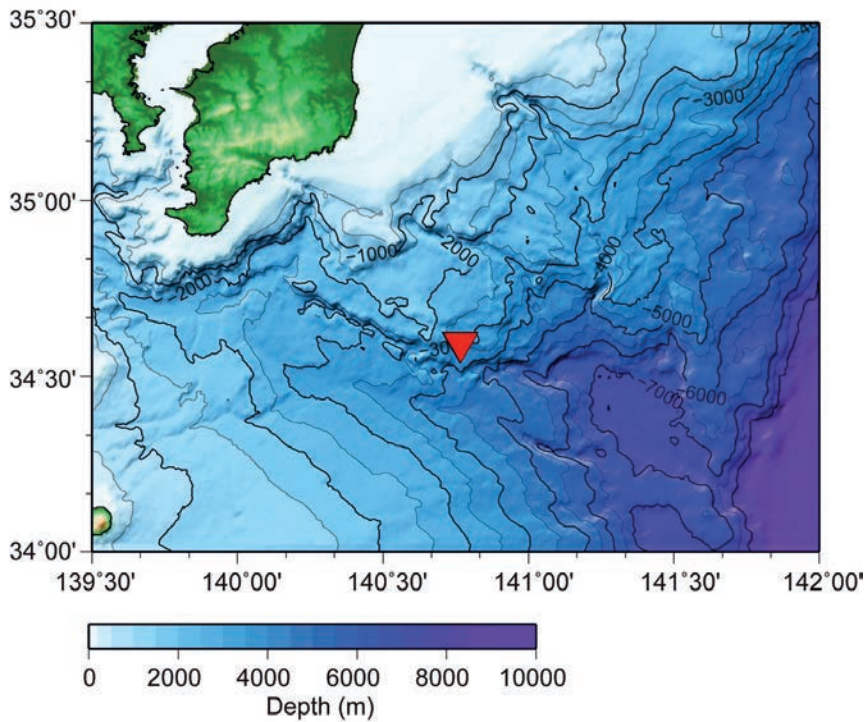*Location of observations*

and tsunamis. NIED operates the Monitoring of Waves on Land and Seafloor (MOWLAS) covering all land and sea areas in Japan. Starting in 2019, NIED has been developing N-net, a cable-type seafloor earthquake and tsunami observation system. N-net will be installed within the seismic source region in the Nankai Trough where earthquakes are anticipated and where no observation network has been established (from the off coast of Kochi Prefecture to Hyuga-nada). N-net is a network system that directly detects earthquakes and tsunamis and reliably transmits the information to land, enabling observation in real time. This new silicon resonant water pressure gauge, which plays an important role in this system, has been adopted. NIED, ERI, and Yokogawa have conducted numerous tests to ensure the reliability of this water pressure gauge, aiming in the event of a Nankai Trough mega-thrust earthquake to contribute as much as possible in the mitigation of damage.

NIED, ERI, and Yokogawa will continue their efforts to improve DRR science and technology to realize a disaster resilient society.

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tion of accurate data during the significant shaking that occurs during an earthquake. In view of the significant ground movement that occurs during an earthquake, this test sought to identify whether the acquisition of measurement data would be impacted by vibrations or attitude changes. It was confirmed that the effect of attitude changes on the water pressure gauge is smaller than conventional water pressure gauges. In addition, in a precision test in which 70 megapascals (MPa) -equivalent to a water depth of 7,000m- was repeatedly applied, repeatability*3 of 0.005% of 70MPa or less was confirmed to be an excellent characteristic. This water pressure gauge uses MEMS technology, so it offers the advantage of each product having the same quality.

To evaluate the performance of the water pressure gauge in an actual seafloor environment, the seafloor observations were performed for a total of 203 days at a depth of 3,436 m in the region off the Boso Peninsula in Chiba Prefecture, Japan. The acquisition of observation data on tsunamis is usually difficult because tsunamis are a rare phenomenon. However, we observed a 7-cm fluctuation in the sea level due to the January 15, 2022 eruption of the Hunga-Ha'apai volcano in Tonga during our evaluation work. Further data analysis also

confirmed that the water pressure gauge was able to observe pressure changes equivalent to a change in sea level of less than 1cm. The confirmed sensitivity indicates that the water pressure gauge has sufficient performance to observe an actual tsunami. The water pressure gauge is a made-in-Japan product with high precision for deep sea applications, and possesses the same level of sensitivity as the most cutting-edge instruments manufactured anywhere in the world.

The observation network for earthquakes and tsunamis is part of the disaster risk reduction (DRR) infrastructure that contributes to the enhancement of DRR information and the development of DRR research on earthquakes

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*1 Yokogawa's silicon resonant pressure sensors employ a sensing method based on the pressure-dependent change in resonant frequency of single crystal silicon resonators, and are characterized by low power consumption, compact size, high sensitivity, high stability, and high pressure resistance. The resonator is sealed in a clean vacuum cavity using silicon semiconductor manufacturing technology, which prevents foreign particles from adhering to the resonator and degrading its performance. In addition, there is no change in performance due to gas desorption, which occurs with sensors using quartz crystal resonators, and stable measurement can be achieved. Yokogawa has been installing pressure sensors using this sensing method in its industrial differential pressure and pressure transmitters since 1991.

*2 Micro electro mechanical systems technology

*3 A characteristic that indicates the precision of measurement under a series of conditions that include repeated measurement with the same measurement procedure, operator, measurement system, operating conditions, and location, as well as being on the same or a similar subject and over a short time period

Revolutionising Pipeline Monitoring: Harnessing Intelligent Digitiser Solutions

Many applications can take advantage of the gains available from the latest intelligent digitiser solutions. Here, a high-end IPC + DAQ solution from Advantech can deliver optimal leak detection, flow monitoring and intrusion detection through continuous long-term data acquisition.

These take the form of a high-end AI-based data acquisition (DAQ) card, with support from a rugged and advanced industrial PC (IPC) platform and an appropriately specified graphics processing unit (GPU). Among the most notable beneficiaries of this technology is set to be the distributed acoustic sensing (DAS) or distributed optical fibre sensing (DOFS) market, where pipelines that extend over many kilometres require acoustic (fibre-optic) sensing for inspection tasks. The high-end IPC + DAQ solution from Advantech and its co-creation partners can deliver optimal leak detection, flow monitoring and intrusion detection through continuous long-term data acquisition.

According to market research company MarketandMarkets, the DAS/DOFS sector will grow from $462m to $792m between 2020 and 2025, representing a notable CAGR of 11.4%. Critical to this growth, however, is efficient and effective DAQ, a task that is far from simple when it comes to the data-prolific ultrasonic inspection of oil pipelines, for example.

Vast data stream

A DAS system serving an oil pipeline will generate in the region of around 1TB of data per day. Some form of edge computing solution is therefore required to analyse and process this vast quantity of data.

Another challenge is the clear need for AI. Efficient algorithms for the detection of events of interest are of the utmost importance. Such events might include someone jumping on a pipeline, or vibration from a flow change or a nearby passing truck. AI can 'judge' and classify each event to reduce false positives.

Also high on the list of challenges is interoperability. DAS systems require connection to other systems and the cloud, so they can immediately alert operators and show the event location. This capability allows the monitoring
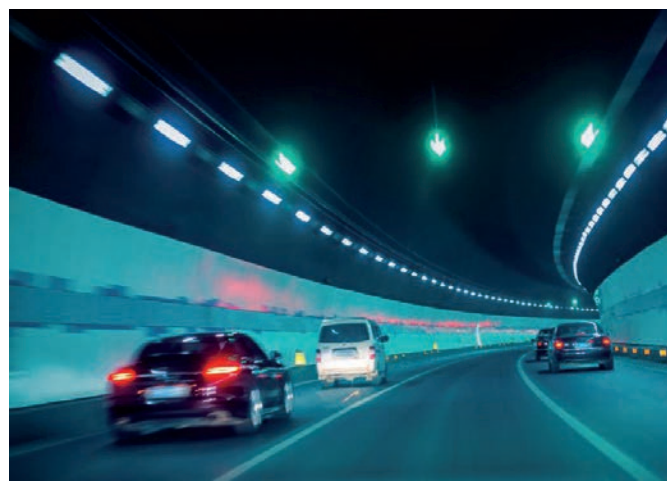
Daniel Sun, Senior Product Sales Manager at Advantech

team to take actions such as changing the operation mode of machinery, modifying pipeline parameters or adjusting alarm security.
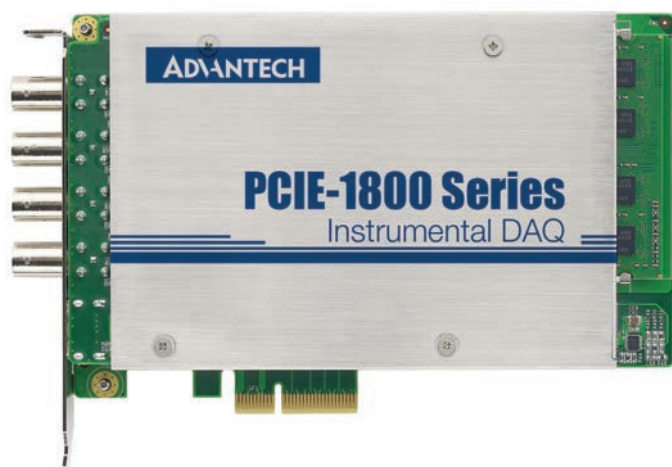
Advantech's latest DAQ card, the PCIE-1840

Transforming tunnel monitoring through intelligent digitiser solutions

Pipelines that extend over many kilometres require acoustic sensing for inspection tasks

System components

So what does a solution look like that is able to overcome all of these challenges and deliver the efficient processing of distributed acoustic sensing data using a deep learning approach? Well, system components will typically consist of: a data acquisition and processing unit to continuously capture large amounts of data; real-time operating systems to analyse the data; and servers in the cloud or on the edge for data archiving, analytics and visualisation.

Although the digitiser market is quite wide in generic terms, Advantech's latest DAQ card, the PCIE-1840, focuses on common industrial applications that include DAS/DOFS. Offering up to 125MS/s sampling rate to retrieve back scattered laser or ultrasonic signals, a 16-bit resolution digitiser with four simultaneous analogue inputs and 2GB on-board memory offers non-stop, high-definition data streaming capability.

Based on this new product, Advantech can offer different AI-enabled solutions. One comprises of an Advantech IPC-242 V3 ultra-compact IPC with the PCIE-1840 and Quadro RTX A2000 GPU card from the co-creation partner NVIDIA. This mainstream AI digitiser features

small form-factor, four 125MHz/16-bit sensor interfaces, Intel 12th Gen Core i CPU of 16C/24T and NVIDIA GPU of 3,328 CUDA cores, 8.0 TFLOPs FP32 computing power. It is suitable for small to medium scale applications such as tunnel monitoring or traffic management.

A more advanced configuration sees an Advantech MIC-770W V3 modular IPC with MIC-75G20 GPU expansion module in which PCIE-1840 and Quadro RTX A4500 GPU cards are installed. This high-end AI digitiser features four 125MHz/16-bit sensor interfaces, Intel 12th Gen Core i CPU of 16C/24T and NVIDIA GPU of 7,168 CUDA cores, 23.7 TFLOPs FP32 computing power. It is suitable for large scale applications such as oil, electric pipeline monitoring or boarder security surveillance. It can act as an edge server which archives data, retrains/deploys AI models and manages digitisers on the field.

Both aforementioned platforms permit the user to add various I/O interfaces in line with project requirements. Such as industrial protocol communication ports or Wi-Fi, LTE to link the digitiser with controllers, machinery or in-house IT systems.

Further use cases

As well as DAS applications such as the ultrasonic inspection and monitoring of pipelines, Advantech IPC + DAQ solutions can benefit many other industries, including automotive. Here, the use of ultrasonics in the non-destructive testing (NDT) of engine parts is widespread at automotive plants across Europe. Another common application is the inspection of industrial motors using transient waveform capture, where the use of Advantech digitiser technology can help testing departments to perform this task automatically.

Put simply, any application that can gain from proven synchronisation and timing to process sensing data effectively should consider what Advantech can offer with its AI-based IPC + DAQ solutions. Thanks to the company's renowned co-creation strategy, these ready-to-go solutions can save considerable amounts of development and commissioning time to bring projects onstream efficiently and cost-effectively.

Daniel Sun,
Senior Product Sales Manager, Advantech

▶▶ 63882 at www.ien.eu

Determining the Potential of Your AI Algorithm Starts with Measurement

The ability to measure, knowing how much of what you measure needs to be processed, and, the ability to process more than one input at a time are the three basic ingredients at the core of every AI algorithm. They are key to understanding the depth of an AI's unique power.

At the core of every AI algorithm are three basic ingredients: 1) the ability to measure, 2) knowing how much of what you measure needs to be processed, and, of course, 3) the ability to process more than one input at a time. To what depth a system can measure can be thought of as its potential. Determining what aspects of those measurements must be sent to the processor can be thought of as delivering that potential. Finally, knowing how to combine the salient parts of those measurements in the correct proportions, known as sensor fusion, is the key to exploring an algorithm's IQ or reasoning potential. Augment that sensor fusion with a feedback loop and the algorithm will have the ability to check and course-correct its logic, a necessary ingredient in machine learning. These three attributes are the key to understanding the depth of an AI's unique power. And like many things, the more you cultivate and calibrate these foundational elements, the better the AI algorithm will perform in the long term. Now that we understand the three areas to explore let's dive into the first component, measurement depth, and how it's critical to the foundation of building a robust, high-performing AI algorithm.
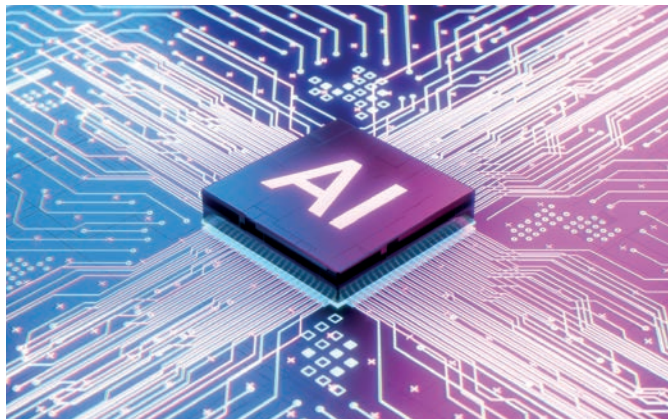
Measurement depth
Metrology is the study of measurement science and measurement depth plays a crucial role in building a robust algorithm. The Gagemaker's Rule, or 10:1 rule, states that a measurement device must be 10x more precise than the desired measurement. The reason that measurement depth is so critical is that it determines the possible level of precision and sets

the algorithm's maximum potential. Therefore, the more precision you have in any given measurement, the greater the AI algorithm's potential. Metrology focuses on the deep understanding of a particular measurement. That measurement can be as simple and distinct as voltage, ground, or temperature or as multi-modal as the functioning of aircraft control surfaces, or as complex as maximising throughput on a manufacturing assembly line. Whether you are measuring a single parameter or several, the depth of each measurement determines the level of programmability that's possible. For instance, measuring a 3 Volt system to 1/10th of a volt is not as insightful as measuring to 1/1000th of a volt. Depending on the system that voltage is powering, the extra precision may be critical for battery life or maybe a distraction. Maximising the potential of any algorithm requires matching the entire end-to-end measurement needs to the needed depth. This is true no matter what's being measured, even data systems, which may not be as immediately intuitive, so let's look at one of those examples.

How to optimise measurement
Enterprise IT stacks are now a complex web of interconnected data systems, each exchanging information aimed at tuning an organisation's operations. These technology stacks include an array of software such as CRM, ERP, databases, order fulfilment, and each with unique data formats and custom application programming interfaces (APIs). According to Salesforce, the average company has over 900 applications in its tech stack, many of them cloud-based and all of them experiencing software updates that can have ripple impacts. Identifying and isolating problems, much less optimising performance across multiple intersecting software applications, is akin to finding a needle in a collection of interconnected haystacks.

Each software application in a tech stack has a different sponsor in an enterprise – finance, human resources, sales, marketing, supply chain – and that primary org's considerations are top of mind for IT. Every enterprise has custom workflows and integrations with numerous applications and backend systems, and user journeys span various paths and are rarely linear. Therefore, even if two enterprises used identical applications in their tech stack, mapping all the exchange points and validating the end-to-end operation would be unique. If there were ever an application in need of AI, this would be it. The measurements, in this case, could be the intersystem data input points, the intrasystem data

The old adage from Lord Kelvin stands true today that "if you cannot measure it, you cannot improve it." To understand the true power of any AI, make sure to start by analysing its measurement breadth and depth.

Jeff Harris, Vice President,
Global Corporate and Portfolio Marketing, Keysight Technologies

▶▶ 63880 at www.ien.eu

exchange points, and the data display points.

Understanding how an AI algorithm would operate in a system like this would start with understanding how it measures points data in three key areas:

1. Measuring how users' interface with the application, regardless of the operating system, which in some cases involves employing robotic process automation (RPA) when button pushes are required
2. Measuring the data exchanges between and command APIs that link the systems in a complex technology stack to ensure they are occurring correctly
3. Measuring on-screen information across omni platforms (desktops and mobile) such as images, text and logos as a human would to see how they render

Evaluating the measurement efficacy starts with its ability to measure regardless of operating system, software versions, devices, or interface mechanisms. The more conditions under which the AI cannot measure, the less impactful it will be in operation.

Conclusion

Whenever you assess the potential of anything, start with the foundation. At the foundation of every AI system is its ability to measure. The more it can measure, the more impactful it has the potential of being. Look at what it is capable of measuring and, more importantly, where it is not capable. Limited sensing results in limited AI algorithm potential.

▶▶ 63138 at www.ien.eu

Reducing Industrial CO2 Emissions Through Increased Motion Efficiency

This contribution from Analog Devices delves into two essential focal points to improve CO2 reduction in the industrial sector: Increased energy efficiency through increased deployment of motor drives, and the impact of digital transformation strategies to deliver increased manufacturing efficiency.

Consumers today are looking for lower carbon products and services. Governments around the world are increasing regulations to reduce carbon emissions to meet their net zero greenhouse gas emissions targets. Navigating the path to net zero will create new opportunities for industrial manufacturing companies to embrace new technologies to accelerate lower carbon manufacturing.

The Paris Agreement in 2015 set out a plan to limit global warming to 1.5°C by 2050. Meeting the 1.5°C target in 2050 requires a >80% reduction in current CO2 emissions. The current trajectory is toward global warming of 1.9°C to 2.9°C, which will lead to a significant reduction in global GDP, displace up to 33% of the world population, and cost trillions of dollars in annual disaster-related losses.

The world has already warmed up to 1.1°C and experts say that it is likely to breach 1.5°C in the 2030s. The challenge to meet the 1.5°C target is significant. It will require a shift in investment away from fossil fuels and toward energy efficiency, renewables, and nuclear power generation as well as carbon capture, utilization, and storage (CCUS) along with other low carbon areas. Figure 1 outlines a path to the 1.5°C target by reducing CO2 emissions to 6 Gt CO2, as covered in World Energy Outlook 2019.1 This study includes two major sections: the Stated Policies

Scenario and the Sustainable Development Scenario. The Stated Policies Scenario considers only specific policy initiatives that have already been announced. The Sustainable Development Scenario describes a path-

way that enables the world to meet climate, energy access, and air quality goals, and is fully compliant with the Paris Agreement. At the same time, it maintains a strong focus on the reliability and affordability of energy for a growing global population. The largest reduction in CO2 emission identified as part of the Paris Agreement is efficiency at 37%.1 Global energy-related CO2 emissions grew by 0.9% in 2022, reaching a new high of over 36.8 Gt. Emissions from industry declined by 1.7% to 9.2 Gt in 2022. With 25% of CO2 emissions coming from industry in 20221, accelerating industrial energy efficiency investments will be a key part of the path to net zero emissions in 2050.

Higher Efficiency Industrial Motors Can Significantly Reduce Industrial CO2 Emissions
The global electricity supply in 2022 was

28,642 terawatt-hours, contributing 13.6 Gt of carbon emissions (36% of global CO2 emissions in 2022).2 Industry consumes 30% of global electricity and within industry, electric motors make up 69% of power consumption.3 With ~450 Mu of motors installed in the industry and ~52 Mu new motors installed in 2022 (split between brownfield upgrades and greenfield developments), new higher efficiency motion assets are significantly reducing electricity consumption and CO2 emissions. Motors are used across industrial applications to drive pumps, fans, compressed air systems, material handling, processing systems, and more. It is estimated that if all deployed motor driven systems were operated at maximum efficiency, it would reduce global electricity demand by 10% and remove 2490 Mt of CO2 emission in 20303 (see Figure 2).
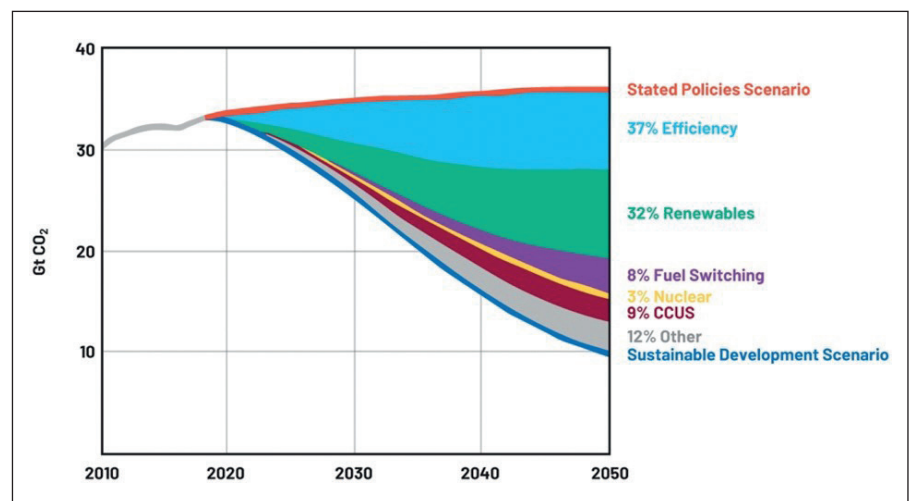

Figure 1. CO2 emissions reductions by measure in the Sustainable Development Scenario relative to the Stated Policies Scenario.
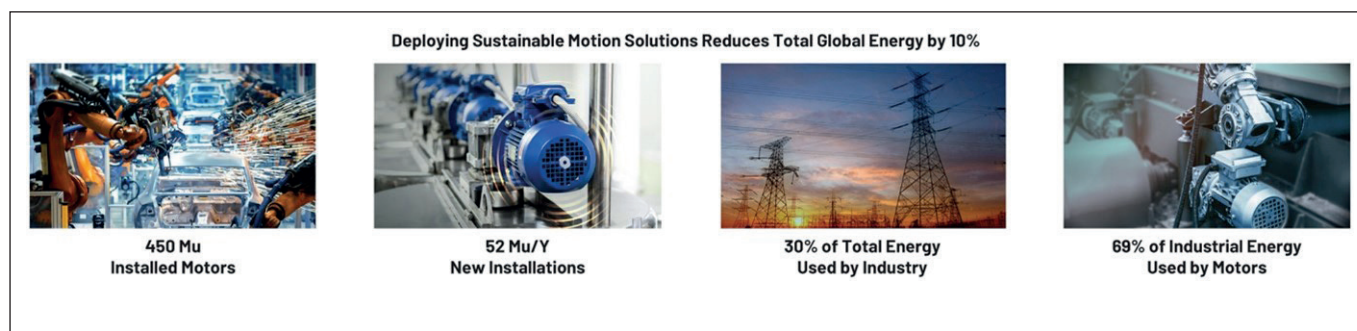
Figure 2. Industrial motors key statistics.

Increased Energy Efficiency Through Increased Deployment of Motor Drives

The most basic and lowest efficiency motion solutions are based on a grid-connected or AC-powered, 3-phase motor that uses a switchgear to provide on/off control and protection circuitry. These basic motion solutions run at a relatively fixed speed, independent of any load variation. Adjustments in output variables (such as fluid flow in pumps and fans) are implemented with mechanical controls such as throttles, dampers, and valves, whereas significant speed changes are implemented with gears. It is estimated that 70% to 80% of all deployed motors today are grid connected and would benefit from being connected to an inverter or variable speed drive (VSD) to reduce energy consumption.

The addition of a rectifier, DC bus, and a 3-phase inverter stage creates an inverter with variable frequency and variable voltage output that is applied to the motor to enable variable speed control. This inverter driven motor significantly reduces energy consumption by running the motor at the optimum speed for the load and application. Examples include higher efficiency pumps and fans. When added to the existing motor of a pump, fan, or compressor, an inverter can typically reduce power consumption by ~25%.

For higher performance motion control applications, a VSD enables accurate torque, velocity, and position control. To achieve this, current and position measurement are added into the basic open-loop inverter drive. Conveyors, winding, printing, and extrusion machinery are typical examples of these applications. It is estimated that between 20% and 30% of all deployed motors in industry are inverter driven or connected to a VSD. By moving more deployed motion assets from grid-connected motors to inverter driven or VSDs, we can significantly reduce the energy consumption and CO_2 emissions of the ~450 Mu of motors deployed in industry.

The Important Role of Motor Energy Regulations

Intelligent motion control solutions are delivering and will continue to deliver significant reductions in energy consumption by moving more applications from fixed speed motors to high efficiency motors and VSDs, in part driven by energy efficiency regulations. This reduction in energy consumption will enable more sustainable manufacturing with reduced CO_2 emissions. To accelerate the deployment of higher efficiency motor driven systems, the International Electrotechnical Commission (IEC) has contributed to the definition of energy-efficient electric motor standards. This includes the IEC 60034-2-1 test standard for electric motors and the IEC 60034-30-1 classification scheme comprised of four levels of motor efficiency (IE1 through IE4). These standards have made it easier to compare efficiency levels between motor manufacturers. They also provide a reference for governments to specify the efficiency levels for their minimum energy performance standards (MEPS), helping countries to meet their energy efficiency and carbon dioxide emissions targets.

IEC 60034-1 Efficiency Classes:
- IE1 Standard Efficiency
- IE2 High Efficiency
- IE3 Premium Efficiency
- IE4 Super Premium Efficiency

Significant progress has been made by governments worldwide to set MEPS for motors. Since 2020, countries consuming 76% of global electric motor system electricity have introduced MEPS for motors at either the IE2 or IE3 level, contributing to reduced industrial electricity consumption.[5] In the EU, since July 1, 2021, a minimum efficiency class of IE3 (Premium Efficiency) is required for motors from 0.75 kW to 1000 kW. A minimum of IE2 (High Efficiency) is required for smaller motors from 0.12 kW to 0.75 kW. Starting July 1, 2023, the MEPS will increase to IE4 (Super Premium Efficiency) for motors between 75 kW and 200 kW in the EU.

When we look at the total cost of ownership of a motor driven system over the life of its deployment, 70% of the total cost is electricity compared to 5% for the purchase of the motor and 20% for the maintenance of the motors (see Figure 3).[6] Therefore, by deploying more efficient motion driven systems, we can significantly reduce the operation cost of industrial motors while also reducing CO_2 emissions.
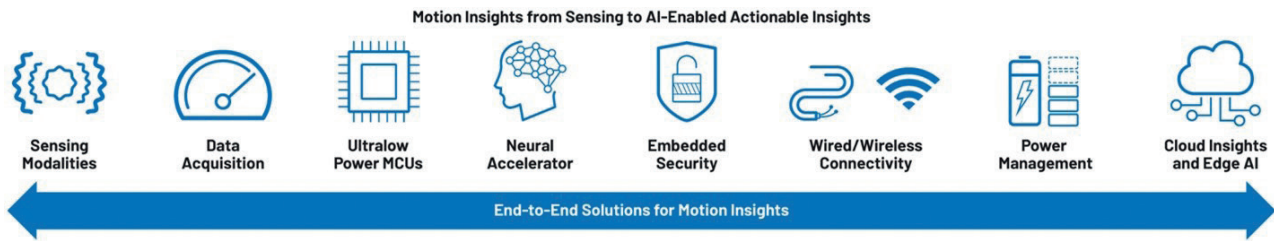
Figure 4. Key technologies to deliver motion insights.

Digital Transformation Strategies to Deliver Increased Manufacturing Efficiency

VSDs use data from voltages, currents, position, temperature, power, and energy consumption combined with external sensors for monitoring vibration, and other process variables. With a converged information technology/operating technology (IT/OT) Ethernet network, motion applications are networked together communicating data and motion insights to cloud-based data storage or on-premises storage. Motion data and insights are now more accessible and can be analyzed by powerful cloud computing and artificial intelligence (AI) to optimize manufacturing flows, reducing the energy consumption and CO_2 emissions created in manufacturing. Access to motion insights extends equipment lifespans, improves manufacturing quality, and reduces unplanned downtime and material wastage while increasing safety in manufacturing plants.

Motor driven systems are now integrating advanced sensing, signal processing, edge AI, and connectivity solutions to create motion data and insights at the Intelligent Edge.

These new insights are communicated to the manufacturing execution system (MES) (see Figure 4). The MES can then identify deployed motors that are being operated significantly below their nominal rated output, resulting in underutilization and increased electricity consumption. Another critical capability is identifying deployed motors that operate too near to or slightly above their rated output, which also results in increased electricity consumption and potential lifetime issues. In a large manufacturing installation with several hundred to several thousand motors deployed, digital transformation strategies are especially crucial to reducing electricity consumption and CO_2.

World Economic Forum— Sustainable Lighthouse Network

The World Economic Forum's Shaping the Future of Advanced Manufacturing and Value Chains platform has set up the Global Lighthouse Network, which recognizes top leaders in manufacturing as lighthouses.7 The World Economic Forum's Global Lighthouse Network showcases real-world examples of

how digital transformation strategies are accelerating the reduction of CO_2 emissions in industry. It is a community of manufacturers using advanced technologies to drive new innovations in smart manufacturing to increase productivity and sustainability. As of January 2023, the Global Lighthouse Network comprises 132 manufacturing sites worldwide, including 13 sustainability lighthouses. Schneider Electric's Le Vaudreuil factory is one of the sustainability lighthouses at the forefront of digital transformation. The Le Vaudreuil facility has demonstrated the impact of data-driven insights to catalyze more sustainable manufacturing by:

- Reducing power use by 25%
- Reducing material waste by 17%
- Reducing CO_2 emissions by 25%

Conclusion

The path to net zero will create new opportunities for industrial manufacturing companies to embrace new technologies to accelerate lower carbon manufacturing. Increased industrial activity (almost half of which occurs in China and India) will double the number of deployed motors in use by 2040. Therefore, the CO_2 reduction impact and the business opportunity size for new higher efficiency motor driven systems will increase significantly. At Analog Devices, we are fully dedicated to driving automation toward a more sustainable and efficient future. Our advanced technologies and solutions are designed to support the next generation of manufacturing systems, focusing on improving every level of efficiency from precise motion control and seamless connectivity to enhanced insights and analytics at the edge.

Maurice O'Brien, Strategic Marketing Manager, Analog Devices

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Figure 3. Total cost of ownership for motor system.
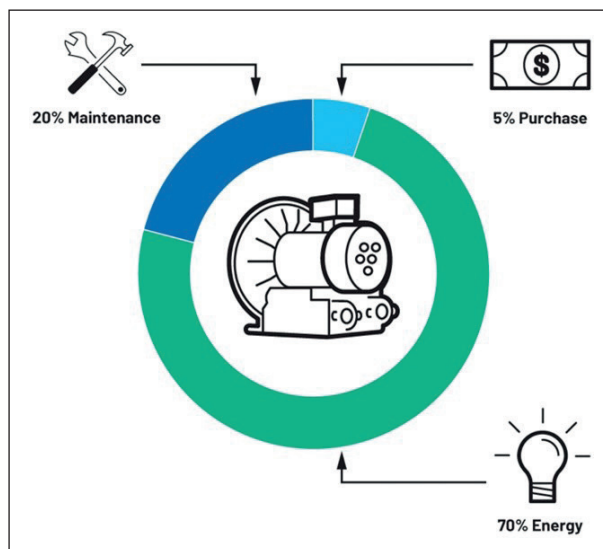
Energy Efficiency Corner: The Notes of Spring 2023

This tribune shared by the President of the European Alliance to Save Energy provides a review of some of the most important energy efficiency acts that have been adopted at the European Union level.

About one year before the next European elections, the EU's legislative machine is turning at full speed. When it comes to energy efficiency policy, last month has been particularly significant. On 10 March the Parliament and Council found a deal on the Energy Efficiency Directive (EED) recast. The agreement is good news as it strengthens the current framework, despite still leaving substantial flexibility to Member States in the implementation.

Just a few days later, the European Parliament adopted the report by MEP Ciaran Cuffe, outlining its position on the revision of the Energy Performance of Buildings Directive (EPBD) which aims to make the EU building stock climate neutral.

These files represent key pieces of the EU Green Deal, and their clear and ambitious revision is a crucial step if we want to be realistic about reaching our 2030 targets.

The interinstitutional negotiations on the EPBD are expected to be complex, as some countries already expressed their opposition to the Parliament's position. The energy efficiency (EE) community needs to step up its efforts to reverse the negative discourse about EU legislation on EE and make it even more clear that if we want to start healing our climate, we need to act now and with available technologies. The positive EED outcome has shown that it is possible to combine climate ambition and flexibility and work together to provide a clear policy framework for governments, businesses and citizens.

There is no other way to go: saving energy is a priority to lower costs for households and industry, cut CO_2 emissions and accelerate the energy transition, while making Europe more resilient.

Winter is over and the EU was able to go through it better than expected. Overall, the bloc reduced its gas consumption by about 19% between August 2022 and January 2023. More efforts will be needed throughout 2023 to prepare for the next winter, which promises to be even more difficult from an energy security point of view. In this sense, we welcome the Commission's proposal to extend for a year the national measures to curb gas demand.

In this case, energy efficiency should also play a key role. According to the International Energy Agency (IEA), further efforts to save energy through buildings and industry, including SMEs, could save about 8 bcm of gas. The IEA also invites EU governments to redirect the resources saved from lower gas import bills to the strategic investments required in energy efficiency and renewables.

At this crucial moment for global climate action, EU Member States are called to act and deliver on energy efficiency. The EU is showing a clear direction of travel, now it is time for everyone to embark on the ship and prepare for a challenging but promising journey, being mindful of the sirens of false solutions.

Monica Frassoni, President, European Alliance to Save Energy

Augmented Reality - A Quick Check with the Third Eye

The push for digitalization has greatly changed the world of work and opened up new opportunities. Augmented Reality (AR) technology is now increasingly in use at LAPP, for example, in production and supply chain management.

In certain areas, the pandemic has brought about some positive developments. This is because, at a time when employees mainly had to work from home and business trips were virtually impossible, many companies pushed their digital processes onwards with great urgency out of necessity.

What is the difference between virtual and augmented reality? A brief definition and delineation: while virtual reality conceals the real world entirely and replaces it with a synthetically generated environment, augmented reality continues to conserve reality and merely supplements this with virtual elements. We see this almost every day on TV when arrows or circles are displayed on sports broadcasts explaining strategic movements. Or in a car when navigation hints appear on the windshield. Augmented reality can also be used to visualise future buildings or entire room designs. Or in the "Pokémon GO" smartphone game, where players can track down virtual Pokémon in the real world.

Supplier selection using AR

This AR technology opens us lots of new possibilities. It is also capable of making many work and coordination processes easier at LAPP. "For us, augmented reality is an important tool enabling us to be there without actually being physically present," says Markus Liller, Head of Supplier Management at U.I. Lapp GmbH. When it comes to selecting suitable sup-

pliers, LAPP is increasingly making use of augmented reality. The starting shot for this digital option was fired during the pandemic: visiting potential and checking up on existing suppliers was virtually impossible at the time because travel was forbidden or else involved an enormous amount of effort. This meant the LAPP Supplier Management team could no longer perform their job in the fullest sense. Site visits were simply no longer feasible.

On the initiative of Purchasing Manager Peter Halbauer, and under the project management of Markus Liller alternative technologies were

sought that would at least enable digital quality assurance. A new partner was finally found in the Italian software provider "OverIT" with its cloud-based software "SPACE1". Initial testing commenced with pre-assembled augmented reality glasses borrowed from the service provider. Today, LAPP has concluded a multiple-year contract with "OverIT" that includes licences for the entire Lapp Group worldwide. Augmented reality glasses are increasingly being used at our many production and sales sites. "In theory, smartphones could also be used with the AR software but the AR glasses mean everyone's hands remain free so that instructions can be followed better" explains Mr Liller.

Hundreds of kilometres digitally bridged

The augmented reality glasses work in much the same way as a hugely powerful digital telescope, which can be used to view the exact book titles on a living room shelf across hundreds or thousands of kilometres – from anywhere in the world. To do this, all you need is a laptop with the corresponding software and a person who is located in this far-off living room and looking at the bookshelf wearing a correspondingly configured pair of AR glasses. The person on the laptop can then tell the AR glasses wearer exactly which book to pull off the shelf or which page of the book to open or else use digital characters on the laptop to do this.
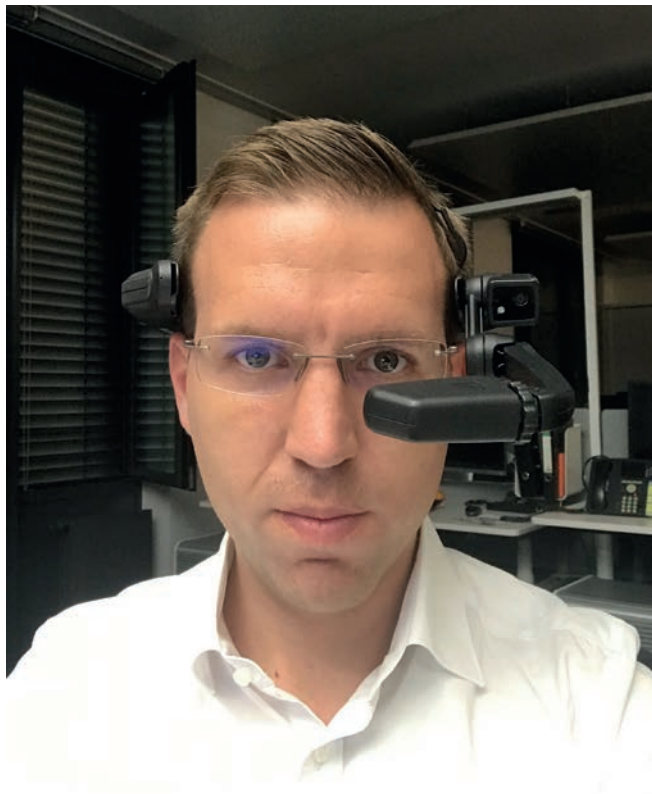
It works no differently in a factory either. An expert sits at the laptop computer and sees exactly what the AR glasses wearer sees at that moment, and can talk to the person, telling him or her exactly what to demonstrate. In case of language barriers, symbols are also possible. The glasses wearer can also see arrows or circles on the laptop and act accordingly.

A wide range of possible applications
AR technology is very helpful in Supplier Management, which is not only about production standards, but also about compliance with human rights and environmental protection as per the new German Supply Chain Diligence Act. For example, the Supplier Management team at LAPP's headquarters in Germany sent a pair of pre-configured Augmented Reality glasses to a service provider to verify a potential supplier from India. The latter then used the glasses to take a tour of their plant. In order to be able to assess compliance with occupational safety measures in reality, an appointment was made at very short notice. At the "other end" in Germany, an employee from Supplier Management sat in front of their laptop and saw exactly what the other person saw with their glasses. He was able to precisely specify which areas of production should be displayed verbally or using digital information. At the same time, he were able to save the corresponding images and videos in order to document the audit. In the end, the cable manufacturer passed the audit and was accepted as a new supplier for LAPP.

But in production too, AR technology can provide help quickly. Recently, for example,

a large machine from China had to be built to expand production capacity in the shortest possible time. As there was still a travel ban, the Chinese manufacturer assisted with the setup by transferring all the steps to their laptop using the AR glasses on site and being able to communicate the next steps of the setup. AR technology also helped in the event of an unscheduled machine failure at night. The machine operator alerted an expert who was not on site. With the help of the AR glasses, the expert was still able to take a close look at the machine and give

the operator precise instructions so that production could be restarted. AR software offers numerous other possibilities besides: it can also display additional information such as maintenance instructions, drawings or fault diagnostics to support the glasses wearer. This is particularly helpful when it comes to troubleshooting. "There is still a lot of unused potential for AR technology. At LAPP, we will certainly continue to develop its use even further," Mr Liller stresses.

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product news

ACTIVE HARMONIC FILTER
Eliminates the work losses and production inefficiencies

Elektra Electronik starts producing the first and single active harmonic filters of Turkey under the DynamiX brand. This product eliminates the energy quality issues originated from harmonics and high neutral grounding voltage, which means electrical pollution, in the factories as well as commercial facilities. Targeting at eliminating the work losses and production inefficiencies, Elektra Elektronik is positioned with the DynamiX as one of the companies which produce the highest performing active harmonic filters in the world. Having a more dynamic structure than system technology with conventional analogue processor, DynamiX active harmonic filter stands out with higher speeds, more advanced and state-of-the-art technology, and its dynamic structure thanks to its processor. DynamiX active harmonic filter plays a critical role in terms of energy quality in the iron steel, maritime, health, textile, automatic and banking industries for which safe and stabile electricity system is of a paramount requirement. Product prevents failures caused by harmonics, or electrical pollution, mitigating the risk of a facility coming to a complete halt, facilitating the machineries have a longer life cycle.

▶▶ 63887 at www.ien.eu

VERSATILE 7-ANGLE MALS DETECTOR
For molecular weight determination

The BI-MwA Multi-Angle Light Scattering (MALS) detector from **TESTA Analytical** offers high performance for light scattering system in molecular weight determination. The Bi-MwA is also a powerful tool that can dramatically increase the capability of any GPC/SEC system enabling the precise and accurate determination of the molecular weights of polymers and nanomaterials in solution. Compact in design, the novel vertical flow path of the BI-MwA avoids trapped bubbles - a problem commonly associated with horizontal light scattering systems. The flow cell inside the BI-MwA has no sharp corners, only conical shapes, meaning previously analyzed samples are easily flushed out eliminating the possibility of contamination from previous samples. Using this MALS detector allows you to eliminate the need for time-consuming column calibration and improve the data quality. The BI-MwA is simple to use but incorporates sophisticated features to help solve challenging light scattering research applications. To use, simply inject the sample into the low-volume, 7-angle flow cell. The sample is illuminated by a temperature stabilized, precision power-controlled diode laser. The stable, high-sensitivity, low-noise CCD detector automatically collects the scattered light. Software then extrapolates the data to zero angle to enable precise absolute molecular weight determination.

▶▶ 63894 at www.ien.eu

WATER VAPOR MONITORING SOLUTION
Designed for observation networks

Vaisala announced the DA10 as a differential absorption lidar (DIAL). Its research-grade and industry-tested water vapor vertical profiler provides local forecasters with access to critical intelligence to predict severe weather. While globally coordinated upper-air observations obtain an overall picture of humidity patterns, this solution continuously measures water vapor within the boundary layer in any location and under any conditions. When combined with weather and climate modeling, the information can enhance nowcasting and forecasting to detect the most severe storms within the next 12 hours with superior reliability and accuracy. Vaisala's DA10 makes this information accessible by utilizing the foloowing core features: Firstly, advanced modeling and data assimilation allow near real-time information for nowcasting and long-term modeling through Numerical Weather Prediction (NWP). Secondly, autonomous, easy setup and use for localized forecasting. No operator is needed, and little-to-no maintenance is required. Moreover, uninterrupted and secure operation 24/7, keeping robust design and cyber and data security top of mind. Last, patented transmitter technology to deliver the industry's first research-grade DIAL technology for operational networks.

▶▶ 63826 at www.ien.eu

HMI MANAGEMENT SYSTEM
Platform-independent visualization of machines

"HELIO" is a Human Machine Interface management system for the platform-independent visualisation of machines and systems. The **KEB Automation** and HMI project solution enables the simple and fast creation of web-based HMI or SCADA applications without programming knowledge. The display is flexible and can be used on different target devices. HELIO relies on modern web technology. Specifically, the development environment and the HMI are executed via the browser and are thus independent of the target device. Consequently, the local installation of a development environment is no longer necessary. Intuitive HMIs are created quickly and easily through HELIO and thanks to web technology the HMIs are responsive and independent of platforms or end devices. Users therefore benefit from maximum design freedom. The new HMI management system provides targeted support in the creation of HMIs by means of detailed project templates. Guided by a design framework provided by HELIO, the developer defines the essential structure for setting up the visualisation. Professional interface design and a high degree of responsiveness are ensured. The visualisation is created automatically. The developer receives the result in real time - with live data from the control system.

▶▶ 63725 at www.ien.eu

SMART ECOSYSTEM OF ELECTRONICS
Combines smart connectors with the SCHURTER Cloud

The Smart Ecosystem combines smart hardware components with the **SCHURTER** Cloud. By using the Smart Connectors, you can easily and securely connect your devices to the cloud and make them IoT-enabled. It monitors, controls and configures your devices from anywhere. Its smart interface (API) allows seamless integration with the customer cloud. The ecocsytem comes with a Smart Connector app for easy configuration of your device. Last, it enables secure and reliable data transmission and storage. No upfront investment is required to use smart connectors. Smart appliance connector systems can be installed in any electrical or electronic device that requires an IEC 60320 connector. Process visualization can be used to derive optimized processes and concrete workflows. Having an energy management system also shows how much energy a company or certain production systems consume - and what continuous and day-to-day possibilities there are to reduce this consumption. Schurter Smart products also allow remote maintenance. In the context of remote maintenance, systems are administered spatially separated. Consequently, the technician is in a different location from the user.

▶▶ 63889 at www.ien.eu

CO2 GAS ANALYZER
For measurements in natural gas pipelines

KECO offers the CarbonHound CO2 Gas Analyzer as an accurate, cost-effective, and low maintenance method to detect and measure carbon dioxide (CO2) in natural gas pipelines, biogas plants, and landfills.

The online process analyzer is ideal for use in chemical and biogas plants, gas processing facilities and landfill industries that need an accurate, dependable, CO2 microprocess-based analyzer as part of quality and process controls. KECO's CarbonHound CO2 Gas Analyzer continuously quantifies the amount of carbon dioxide in sample streams in real time using a non-dispersive infrared (NDIR) method of measurement. Once introduced with a sample, the infrared detection element provides an output proportional to the concentration of carbon dioxide. The signal is digitized as a 4-20 mA output, relay alarms, RS-485, or TCP/IP Ethernet to work in different process control systems.

▶▶ 63893 at www.ien.eu

VIBRATION SHAKER
Enables to carry out common forms of vibration testing

Ruggedisation to prevent changes in focus from shock and vibration is often enabled by simplifying the lens design and reenforcing the mechanics of the optical system. The company's new ETS MPA101-L215M Vibration Shaker coupled with a DTC Venzo 880 controller is certified and calibrated in accordance with ISO standards. This enables **Resolve Optics** to not only carry out all the common forms of vibration testing, but also undertake specialist vibration / shock qualification tests in accordance with customer requirements. Mark Pontin, Managing Director of Resolve Optics commented "Environmental testing has become more and more of a selection criterion for clients seeking development of a ruggedised lens or optical system. The requirement for 'proof of operation' vibration and shock testing is the most common environmental test we are asked to undertake. Our new vibration test facility enables us to carry out Random, Random on Random, Sine Sweeps, and Classic Shock tests and provide detailed reports of the results from the test carried out. This allows Resolve Optics to not only qualify the ruggedised lenses we supply but we can also provide vibration testing for our customers systems as well". He added "Our new shaker may be a baby in the vibration world but it can shake 20 Kg at 9 g rms and 12 Kg at 14 g rms, making it a very capable machine".

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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.

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