iNDUSTRY

WORLDWIDE

INTERNATIONAL INDUSTRIAL MARKET MAGAZINE

INTERNATIONAL INDUSTRIAL MARKET MAGAZINE

www.induportals-media-publishing.com

INDUPORTALS
MEDIA PUBLISHING

WORLD WATER WORKS LAUNCHES ARXZYME ANAEROBIC PRODUCTS TO BOOST DIGESTER EFFICIENCY

New powder and liquid bioaugmentation solutions enhance process stability, increase methane yields, and accelerate recovery in anaerobic treatment systems.

Available in both powder and liquid formats, the four new products are designed to work synergistically with each other and are compatible with most existing treatment programs. They include:

• ArxZyme AN FOG Catalyst: Engineered to break down complex fats, oils and greases (FOG). It combines specialized lipase-producing anaerobes with targeted enzymes to prevent the accumulation of inhibitory compounds and maximize biogas potential in oxygen-free environments.

• ArxZyme AN Protein Catalyst: A blend of anaerobic proteolytic microbes and catalytic enzymes that accelerates protein degradation. It enhances the conversion of proteins into bioavailable peptides, amino acids and valuable volatile fatty acids (VFA), boosting methane production and improving overall digester efficiency.

• ArxZyme AN MicroNutri: A micronutrient blend with 32 chelated trace metals, macronutrients and buffering agents. It optimizes anaerobic digestion processes by supporting peak biological activity, stabilizing pH levels and increasing methane yield. This product helps systems recover faster from upsets and prevents common operational issues like digester souring.

• ArxZyme AN Methane: A microbial solution containing over 42 specialized microorganisms. It is engineered to supercharge methane production by providing comprehensive biological support across all four phases of anaerobic digestion. This product is ideal for accelerating digester start-ups, recovering from toxicity events and maximizing biogas yields.

These products address critical challenges in anaerobic treatment systems by enhancing process stability, increasing biogas production and improving operational efficiency. Facilities can expect accelerated digester start-ups, faster recovery from system upsets and maximized methane yields — all while reducing sludge volumes and preventing common issues like long-chain fatty acid (LCFA) toxicity and digester souring.

WWW™ ArxZyme™ bioaugmentation and biostimulation products complement WWW's comprehensive wastewater treatment solutions portfolio, which includes technologies for removing fat, oil and grease, total suspended solids (TSS), biochemical oxygen demand (BOD), biological nutrient removal (BNR) and more in various industrial and municipal applications.

www.worldwaterworks.com

MORE INFORMATION

4

By Milton D'Silva
Technical Article editor

DIGITAL TWINS
IN INDUSTRIAL AUTOMATION

Digital twins serve as a cornerstone of Industry 4.0, empowering companies to innovate faster, operate smarter, and build resilient, future-ready ecosystems, says Milton D'Silva.

Digital twin is a virtual copy or replica of a real thing. Image source: Siemens

I n simple terminology, a digital twin is a virtual copy or replica of a real thing – an object, a factory or plant or building, a process or a system – on a computer. This digital twin is not just a drawing or a 3D model – it is in fact a multi-dimensional graphical representation that behaves like the real thing of which it is a replica. The digital twin is connected to the real object or process through sensors and IoT devices and is an interactive model in the sense that changes made on one are reflected in the other or mimicked by it. To draw a simple analogy, it is like a video game of a race car where a real car is connected by sensors to the virtual replica on the screen which is manipulated by the player.

Though the term digital twin first appeared in the records of NASA only in 2010, the American space agency was using the concept right from the 1960s in connection with the Apollo programme, when two identical models were built of the spacecraft to study their behaviour and maintain a record of the actual performance during the missions. It is the aerospace and aviation industry that has been at the forefront of exploring and developing the concept of digital twin further over the next three decades. In 1989, when Boeing was developing the 777, it was the first time a 'digital mock-up' of the entire aircraft was created using Dassault Systèmes' Catia software. The digital mock-up allowed for virtual design, simulation, and testing of the aircraft before physical prototypes were built, opening a new era of paperless aircraft design. Much later, talking about the experience, Bernard Charlès, the then Vice Chairman and CEO, Dassault Systèmes, said, "*In 1989, we created the first virtual twin of a giant airplane, the Boeing 777.*"
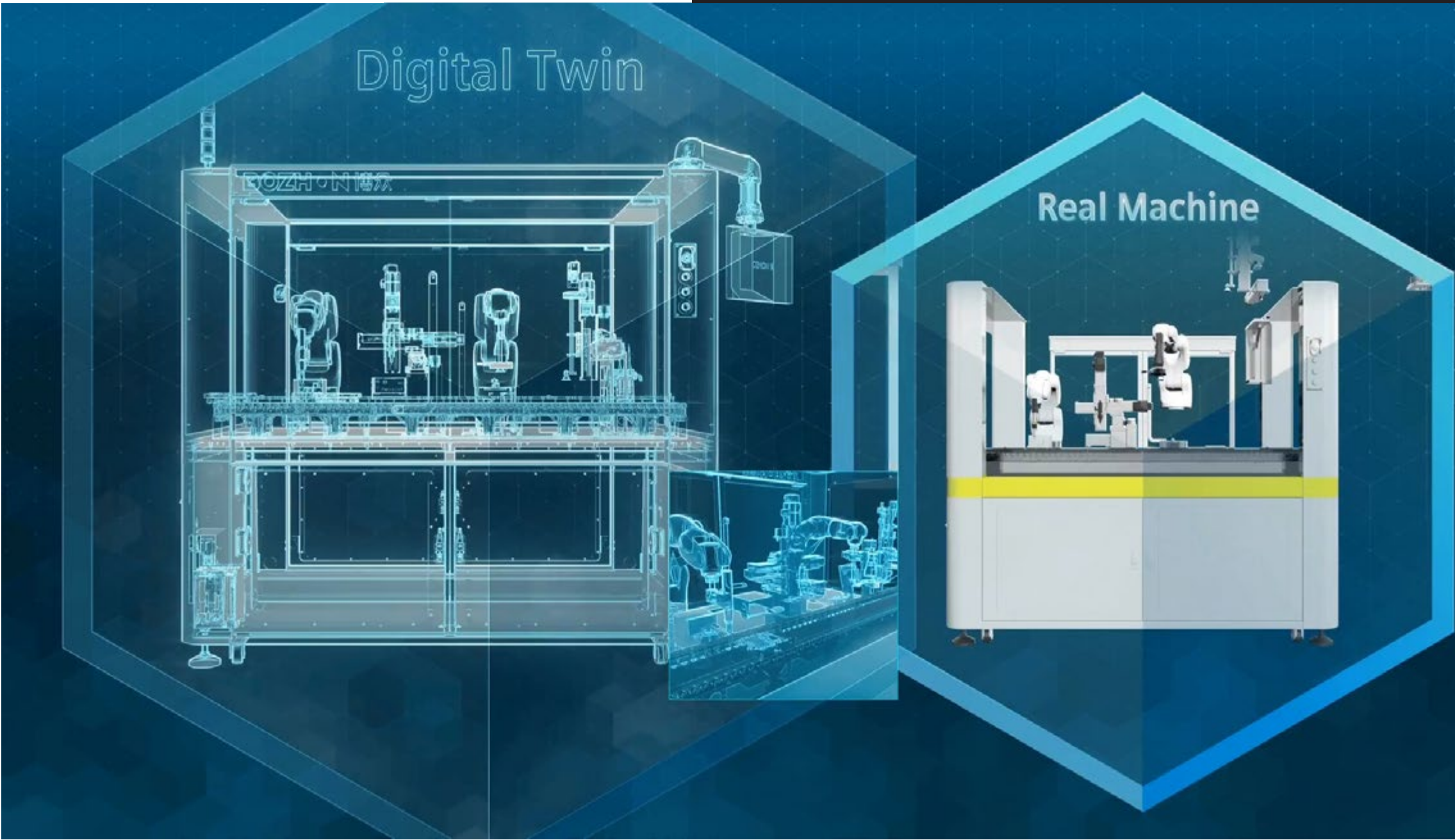
Today, digital twins are regarded as one of the pillars of industrial automation in the Industry 4.0 era, and are not only helping in design and development of products and plants, but also provide a virtual mirror of physical assets, facilitating real-time monitoring of their performance and status. Digital twins are also the most important of the core technologies that constitute the industrial metaverse, the emerging ecosystem for next-gen manufacturing. Among the leading vendors of digital twin technologies are global automation companies like ABB, Ansys, AVEVA, Bosch, PTC, Rockwell Automation, and Siemens. These are just a few names, and there are scores of other companies including Bentley Systems, Cisco, IBM, Microsoft, NVIDIA, Holo-Light, QIO Technologies, etc., with platform services and more. This article examines the role of digital twins in industrial automation in all its aspects.

Understanding digital twins
The opening sentence of this article explains what a digital twin is, in very simple terms. However, for professionals in the automation industry, a digital twin is more than a virtual replica of an object or process. It may be defined as a dynamic, virtual representation of a physical asset, process, or system across its lifecycle, continuously updated with real-time data from sensors, simulations, and other sources, enabling monitoring, analysis, prediction, and optimisation of performance. This means the digital twin in actual use in industry enables real-time mirroring of physical assets through data, models, and analytics. It is achieved by a continuous data feedback loop formed by: sensors → data platform → analytics → actionable insights → control action. To be precise, the digital twin must be kept up-to-date with the real-world counterpart, typically via real-time or near-real-time data flow, ensuring the virtual model accurately reflects the physical one.

The basic characteristics of a digital twin are:
• Dynamic & virtual – It's not a static model; it evolves as the physical counterpart changes.

• Covers assets, processes, and systems – Applicable from a single machine to an entire supply chain.

• Lifecycle perspective – Starts at design, continues through operation, maintenance, and end-of-life.

• Data-driven – Real-time or near-real-time data integration is essential.

• Action-oriented – The purpose is not just to mirror reality but to monitor, analyse, predict, and improve outcomes.
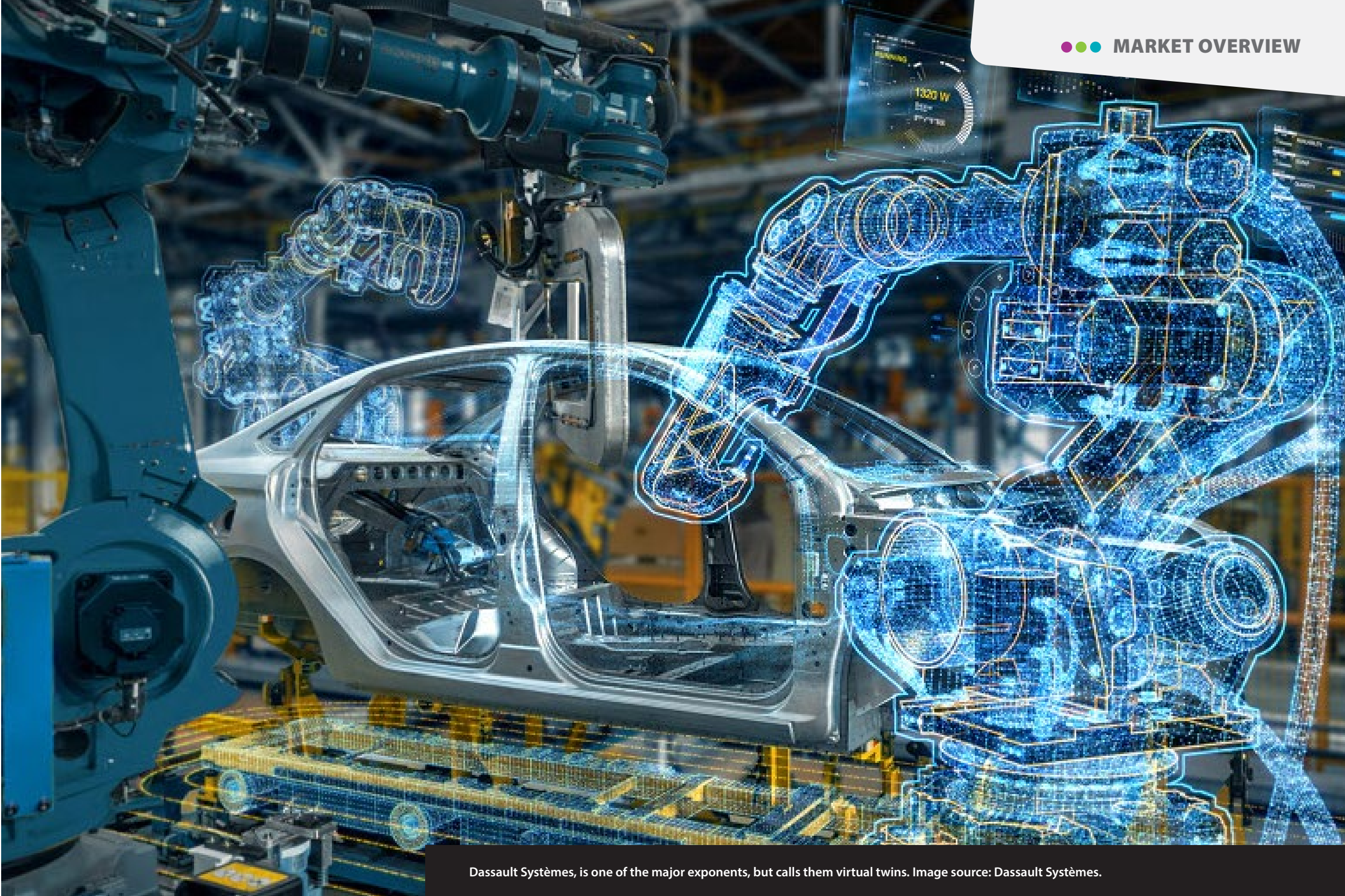
Dassault Systèmes, is one of the major exponents, but calls them virtual twins. Image source: Dassault Systèmes.

Enabling technologies
At this point it would be very relevant to pause and consider the technologies that enable the functioning of the digital twin. The key enabling technologies are:

• IoT and industrial IoT (IIoT)
• Edge and cloud computing
• Artificial intelligence and machine learning (AI & ML)
• Extended reality (XR) – an umbrella term for all immersive technologies
• 3D modeling & simulation software, and
• Connectivity standards (OPC UA, MQTT, 5G).

These technologies work together to create a dynamic, intelligent, and trustworthy digital replica of a physical object or system. Internet of Things (IoT) and its industrial sibling, the IIoT provide the real-time data stream from physical assets through sensors, enabling continuous monitoring

and feedback for the digital twin. AI and ML are crucial for data analysis, predictive maintenance, anomaly detection, and automated decision-making within the digital twin. Cloud computing provides the scalable infrastructure for data storage, processing, and simulation capabilities needed for complex digital twins. XR technologies allow for immersive interaction with the digital twin, enhancing user experience and facilitating remote collaboration. Advanced modeling and simulation include high-fidelity physics-based models, reduced order models, and surrogate modeling, which are essential for accurate simulations and scenario analysis within the digital twin. And connectivity standards enable seamless communication and data exchange within industrial and IoT systems and devices.

Types of digital twins
There are different types of digital twins used in industry, though the basic concept is essentially the same. The difference is in the details, usually based on the scope of their application. The main types of digital twins include:

1. Component/Part Twins: These are the most basic, also the smallest, as they are used only for an individual part or component, rather than the whole machine or system. This type of digital twins relate to properties, condition, and behaviour of a single component, e.g., a cylinder or a piston, a valve, etc., and used for material stress analysis, design optimisation, or early fault detection.

2. Asset Twins: These represent an entire physical asset or piece of equipment, and actually show how various components interact within a specific machine or device, e.g., an engine or a compressor, generator or alternator.

Virtual copies of physical assets make it possible to simulate and optimise workflows and processes.
Picture credit: Bosch

They are used for monitoring performance, predictive maintenance, operational optimisation, etc.

3. System/Unit Twins: System or Unit twins represent a group of assets that work together as a functional unit, and capture interdependencies and process flows between multiple assets within a manufacturing or process plant. Their application is for process optimisation in a production line, analysing bottlenecks, etc.

4. Process Twins: These represent end-to-end manufacturing or operational processes and are designed to simulate workflows, production steps, and process dynamics. The idea is to ensure efficiency improvement, scenario testing, throughput optimisation, and the like.

5. Plant/Facility Twins: These are for the full production facility or plant, and integrate multiple system twins to provide a holistic view of operations. They are used for tasks like plant-wide energy management, safety compliance, capacity planning, etc.

6. Network/Supply Chain Twins: As the name implies, these are applied to the entire interconnected supply chain or distribution network, to track product flows, logistics, and demand-supply dynamics. Their purpose is inventory optimisation, risk mitigation, resilience planning.

7. Human-Centric Twins: These digital twins mirror human operators, maintenance crews, or customer interactions, to simulate ergonomics, task execution, and decision-making impact. Obviously, the application of these twins are in matters concerning workforce safety, training, and performance analysis.

8. Hybrid or Composite Twins: These twins combine multiple types, i.e., two or more of the types described above, for integrated insights in specific scenarios. The purpose is to give multi-layered visibility for complex, interconnected systems. Their application is in more advanced cases like smart factory control, or industrial metaverse ecosystem.

Digital twins and industrial automation
Now having understood the basics of digital twins, the next thing to examine is, what purpose do they serve? What are the application areas? But before that, there is also the matter of how are digital twins integrated with the industrial automation ecosystem, more specifically with the PLC/SCADA/DCS environment? This is achieved by using communication protocols like OPC UA and custom APIs to establish bidirectional, real-time data exchange between the physical assets and their virtual models. This allows the digital twin to receive live data for monitoring and simulation, while also sending optimised control strategies back to the SCADA or DCS for validation and execution in the physical world, enabling predictive maintenance, performance optimisation, and virtual testing. Data flows from physical assets to the digital twin, where analytics provide insights into production processes, and these insights are then fed into the MES for real-time shop floor management and the ERP for higher-level business planning, creating a unified and intelligent manufacturing environment.

When it comes to applications in industrial automation, digital twins have many, which are basically focused on optimising processes, enhancing efficiency, and improving overall performance. These objectives are achieved through key areas that include predictive maintenance, system simulation, process optimisation, and quality control. Above all, digital twins play an important role in virtual commissioning as well as operator training and simulation of actual operations. The following paragraphs take a closer look:

1. Predictive maintenance: One of the most cost-effective maintenance practices, digital twins can be used in predictive maintenance to monitor the performance of equipment and systems in real-time, allowing for the prediction of potential maintenance needs. The digital twin can identify anomalies by analysing the data from running equipment and predict when maintenance will be required, enabling proactive and timely interventions.

2. System simulation and optimisation: By simulating the behaviour of complex systems, such as production lines or entire factories, under various conditions, the digital twin allows engineers to test different scenarios, optimise production processes, and identify bottlenecks without disrupting physical operations. By simulating different layouts, workflows, and process parameters, manufacturers can fine-tune their systems for maximum efficiency and throughput.

3. Process optimisation: What is applicable to systems, can be done to the entire process as well. Digital twins can analyse data from various sensors and control systems to identify inefficiencies in manufacturing processes. This can then be used to optimise material flow, energy consumption, and resource utilisation, leading to reduced waste and increased productivity.

4. Quality control: Another important aspect of production is quality control and in this respect, digital twins can be used to monitor product quality throughout the manufacturing process, identifying defects and deviations from specifications. This is achieved by analysing data from sensors and inspection systems, detecting potential quality issues early on, preventing them from escalating and causing further problems.

5. Training and education: Digital twins can serve as excellent training tools for operators and maintenance personnel. Since the virtual environment mirrors the real working of the system, users can interact with it through the digital twins and get acquainted with it, learn how to operate and maintain the equipment safely and efficiently. This can shorten the learning curve for new employees without the need for elaborate prototypes.

6. Remote monitoring and control: Perhaps the best application of a digital twin is for remote monitoring and control of industrial assets. This is not a case of just switching something on or off by remote, but real-time visibility and management of a plant or equipment from anywhere. This is particularly useful for geographically dispersed operations or for monitoring hazardous environments.

7. Improved collaboration: Another great application of digital twins is for collaboration between different teams, either on premises or different locations, working on a common platform by sharing data and insights, carrying out changes or modifications in design, or troubleshooting a fault.

Overall, the above applications give a very fair idea of how powerful a tool the digital twin is in optimising operations, enhancing efficiency, and driving innovation across the entire product lifecycle.

ABB PickMaster Twin, helps reduce commissioning times. Image source: ABB

Benefits and return on investment (RoI) of digital twins
While advanced technologies like digital twins are available and they make a significant impact in discrete manufacturing as well as process industries, when it comes to implementation, the most important factor that comes into play is the return on investment (RoI). While within companies there is often a tussle between the accounts folks and technocrats, a forward looking management ought to take the decision in the best interests of the organisation, even if it entails a certain amount of risk. So is the case with digital twins. On the positive side, with the benefits becoming clear with successful use cases, adoption is now growing across industries – manufacturing, oil & gas, energy, healthcare, aerospace, smart cities, among others – and organisations are now more convinced about the value proposition.

Listed here are some of the important benefits of digital twins:

1. Operational efficiency: Digital twins, as seen in the applications section, enable real-time monitoring and predictive insights that reduce downtime. They also help optimise maintenance schedules (predictive vs. preventive vs. reactive), and reduce unplanned outages, ensuring increased equipment availability.

2. Cost reduction: Increased efficiency leads to maintenance cost savings through predictive maintenance. Optimised performance also leads to lower energy consumption and thus further cost savings. The other benefit is reduction in spare parts inventory by forecasting needs more accurately.

3. Improved product & process design: With digital twins facilitating virtual testing of products before physical prototyping, companies are now benefitted in terms of faster time-to-market. Also early identification of design flaws lowers R&D spend and prototyping costs.

4. Enhanced decision making: Digital twins are data spinners – a humongous amount of data that provides rich insights, which in turn improves asset lifecycle management. The 'what-if' analysis facilitated by simulation of different scenarios supports better strategic planning. An additional benefit is worker safety that results from better visibility of the plant operation.

5. Sustainability: One of the most important benefits that derives from the other benefits described above is that digital twins contribute to sustainability. Optimised energy and resource usage reduces carbon footprint, and helps industries move towards net zero goals by simulating and validating greener processes.

6. Customer experience & new revenue models: Finally, personalised products and services through simulation-driven design enables 'as-a-service' models by continuously monitoring asset usage, leading to better customer experience opening avenues to new revenue models.

Numerous studies and reports have demonstrated a significant RoI for digital twins across various industries. A recent report by Visual Capitalist, one of the fastest growing online publishers globally, citing a survey by Hexagon, mentions median RoIs over 200% in sectors like energy and manufacturing. Even if this sounds more of an exception, the Hexagon survey says 92% of companies tracking RoI see returns above 10%, while half of companies reported returns above 20%. It also notes that 74% of surveyed executives expect to increase their spending on digital twins next year. Companies that embrace this technology early already see the rewards, positioning themselves ahead of competitors that are slower to adapt.

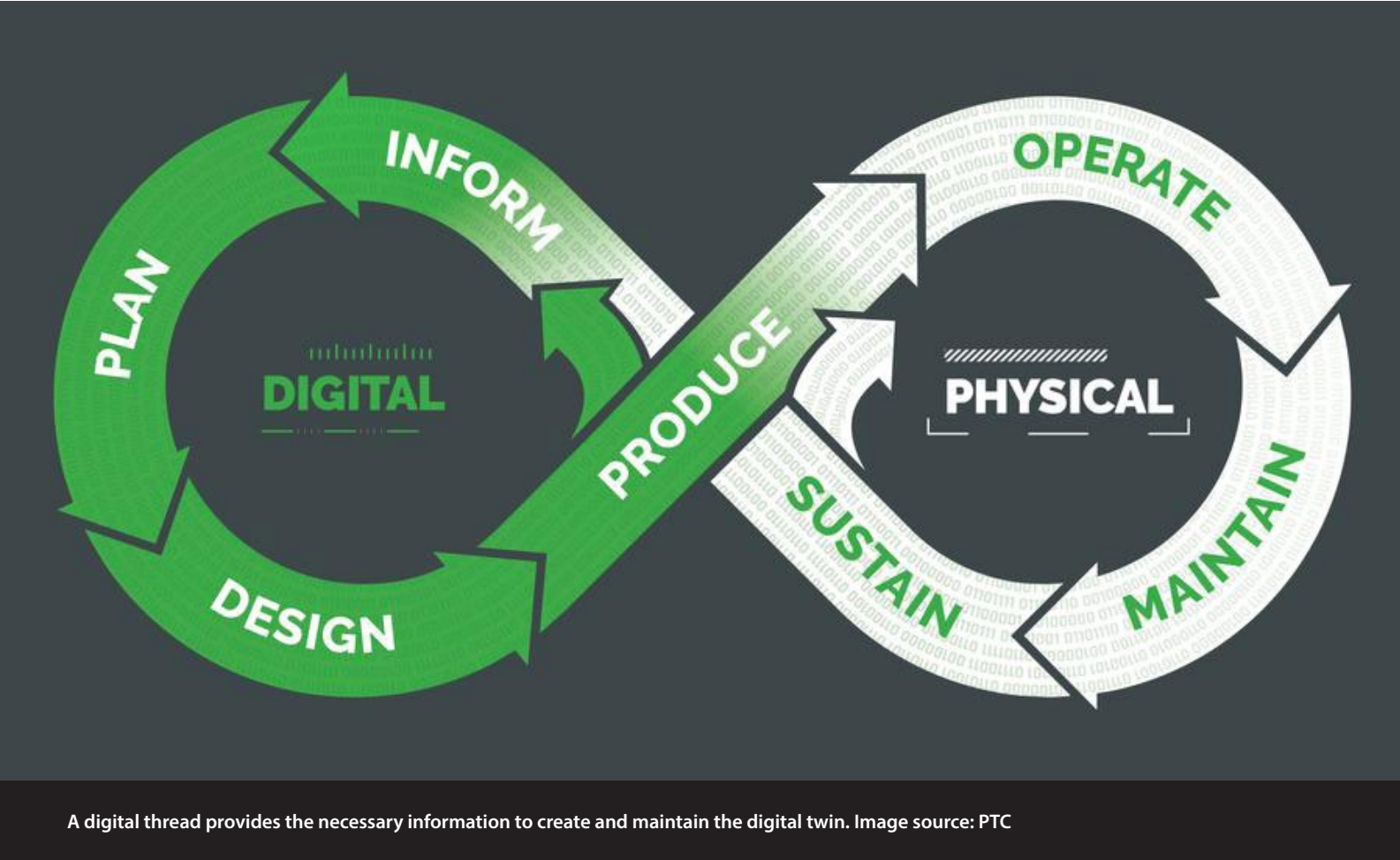**Challenges and barriers to adoption**
With the kind of attributes and advantages the digital twins possess as seen in the preceding paragraphs, there should be widespread adoption of this technology in industry, right? While the leading industrial players have embraced the digital twins and put them to work to great advantage, when it comes to wider adoption, there are the usual challenges and barriers, which are rather common when anything new becomes available. So what exactly are these obstacles?

Predictably, the foremost and the most significant hurdle is the cost of implementation. While the digital twin brings great value to the table, building and maintaining one requires substantial investment in sensors, connectivity, high-performance computing, besides specialised software. For many organisations, especially in capital-intensive sectors like oil & gas, manufacturing or core sector industries like mining and steel, the initial expenditure can be very high, and RoI is not visible in the short to medium term, which is a definite dampener.

Apart from cost, there is another important issue common to most industries, which is the legacy equipment and the complexities posed in integrating any new technology. In a way, this too is cost related as companies do not discard working machinery so easily, as the capital expenditure in acquiring new machinery and equipment is way too high. With legacy systems not necessarily fully compatible with the requirements of the digital twins even after retrofitting with sensors and IoT devices, management remains wary about the feasibility of whole concept, putting off decisions for another day.

Lack of adequately skilled manpower is yet another barrier as digital twins demand expertise in multiple disciplines like IoT, data analytics, artificial intelligence, and domain-specific engineering. As organisations are often struggling to find the right persons and the knowledge gap of their existing staff too wide to bridge, the entire decision making process suffers a setback.

Another challenge, no less daunting, is related to data. Digital twins require high-quality, real-time data, at a time when many companies are still facing the serious issue of data silos, incomplete records, and/or poor standardisation across systems. This is exacerbated by the cultural resistance within organisations, where employees fear digital

A digital thread provides the necessary information to create and maintain the digital twin. Image source: PTC

technologies in general, viewing them as potential threats to their jobs. The fear of automation-driven job losses or increased scrutiny of their routine at work drives them even more fiercely into silos, reluctant to share not only the data but also knowledge.

Finally, there is also the ever present threat of cyber attacks and data breaches. The growing reliance on connectivity raises cybersecurity and data privacy concerns, as sensitive operational information becomes exposed to potential threats. The absence of standardisation and regulatory clarity also acts as a hindrance for widespread deployment of digital twins, but more of that in the following paragraphs.

Standards, interoperability, and best practices
When it comes to standards and frameworks for interoperability in digital twins, it is a work in progress, taking into account the various factors like security, data integrity, human-digital twin interaction, and domain-specific application, etc. Efforts are being made by various organisations like the ISO, IEC, IEEE and OPC Foundation to develop the basic standards to ensure consistent, secure, and reliable digital twin deployments.

One of the earliest is the ISO 23247 series, published in 2021, called Digital Twin Framework for Manufacturing.

This defines the reference architecture, terminology, and information flow for digital twins in manufacturing. It standardises how physical entities, digital representations, and data exchange should be structured. ISO 10303 STEP – Standard for Exchange of Product Data – facilitates seamless exchange of product model data across different CAD, CAM, and PLM systems. Further, ISO 15926 is a standard for data integration, sharing, and handover in process industries, useful for lifecycle data continuity.

Then there is IEC 62832 (Digital Factory Framework), which provides a structured way to describe a digital factory model, and supports interoperability between engineering and operations. Further, the IEC 61512 (Batch Control) and IEC 62264 (Enterprise-Control System Integration) offer frameworks to link business systems with control systems, crucial for digital twin deployment.

Besides, there are industry-specific standards like OPC UA (IEC 62541), which is a widely adopted communication standard for secure, interoperable, and vendor-independent data exchange between machines, sensors, and digital twins. The MTConnect is an open, royalty-free standard that allows manufacturing equipment to share data with higher-level systems (MES, ERP, digital twins).
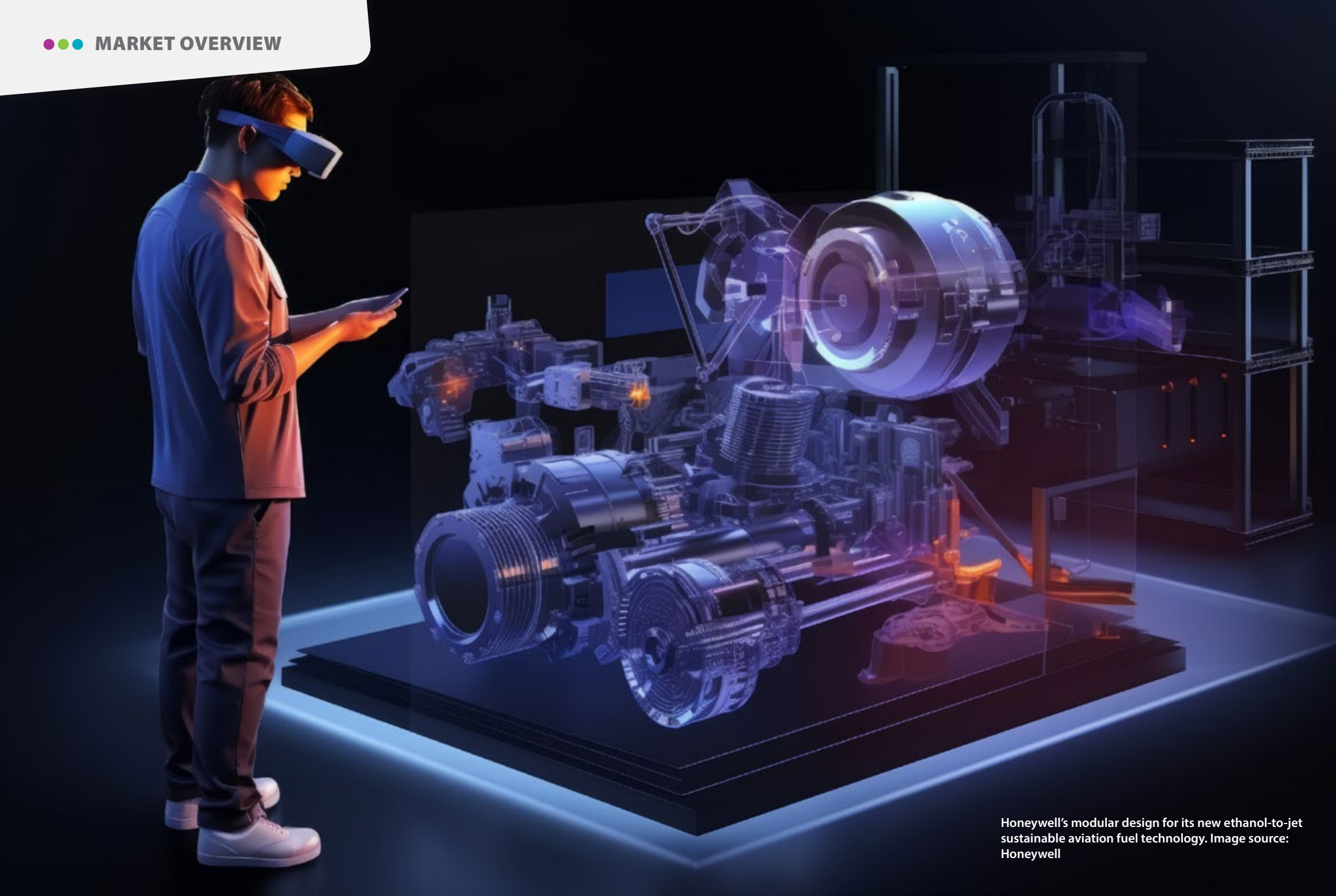
Honeywell's modular design for its new ethanol-to-jet sustainable aviation fuel technology. Image source: Honeywell

- Use open standards (e.g., ISO 23247, OPC UA) for interoperability to avoid vendor lock-in and enable smooth integration.

- Secure data flows, especially when connecting OT with IT and cloud environments, with effective cybersecurity measures.

- Involve operations, IT, engineering, and business units for holistic adoption.

- Cover the entire product/plant lifecycle (design, build, operate, maintain).

- Use machine learning for predictive insights, not just visualisation.

- Keep the digital twin synchronised with physical changes to ensure accuracy.

- Track performance improvements, cost savings, and downtime reductions to justify scaling.

Conclusion

The manufacturing industry is rapidly transforming, bridging the gap between the physical and digital worlds. Digital twins are an important part of this transformation. By enabling manufacturers to simulate, monitor, and optimise operations in real time, digital twins help unlock unprecedented levels of efficiency, quality, and innovation. With data integration and AI-driven analytics, digital twins provide actionable insights to reduce downtime, extend asset life, and accelerate product development cycles. More importantly, they support predictive and prescriptive decision-making, in the process help transit from reactive to proactive maintenance and further, even autonomous operations.

Yet these are early days; not the entire industry is on the same page of this chapter of advanced automation. Successful adoption requires a holistic approach – aligning technology infrastructure, workforce skills, cybersecurity, and governance frameworks with clear business objectives. As industry standards evolve and interoperability improves, digital twins will become more accessible and scalable across enterprises of all sizes. For manufacturers, embracing digital twins is no longer optional but essential. Ultimately, they serve as a cornerstone of Industry 4.0, empowering companies to be resilient, a prerequisite for future-ready ecosystems that can contribute meaningfully to long-term growth and sustainability.

When it comes to architecture – how digital twins are actually built – there is a choice between Open architectures and Proprietary ecosystems. An open architecture uses standardised protocols and interoperable components for high flexibility, scalability, and integration with diverse third-party systems. This fosters a collaborative, future-proof ecosystem but potentially faces setup complexity and varied support. A proprietary ecosystem, on the other hand, is a tightly controlled environment by a single vendor, offering potentially superior quality, strong support, and seamless integration within its own products, but this comes at the cost of vendor lock-in, limited customisation, and potential future incompatibility with external technologies.

While there are merits and demerits in either, the choice between open and proprietary architectures for digital twins depends on the specific needs of the user organisation based on a few key factors like:

- What is the need for integration? If it is to connect with a vast array of existing or future systems, then open architecture is a better choice.

- For better control and stability, especially for users who prefer a curated, high-quality experience with strong support and not much concern for external integration, a proprietary ecosystem may be suitable.

- In terms of future strategy, Open architectures are generally considered more agile and future-proof, making them a

strategic advantage for a dynamic digital transformation journey.

The implementation of digital twins is an important decision for an organisation and needs careful consideration of all aspects. However, very briefly here are the best practices for implementing digital twins in manufacturing:

- Make a small beginning with a pilot project before plant-wide deployment.

- Define what the digital twin should achieve (e.g., predictive maintenance, process optimisation).

- Ensure high-quality, standardised, and real-time data integration from sensors, machines, and IT/OT systems.

●●●

HONEYWELL: 3 WAYS AI IS REVOLUTIONIZING BUILDINGS

Honeywell details three ways AI is revolutionizing building management, improving maintenance, security, and energy efficiency, with a survey showing 84% of managers plan to increase AI use.

In a state-of-the-art office tower in the heart of the city, operations hum along with precision. The HVAC system adjusts in real-time to fluctuations in occupancy. Comfort is optimized without wasting energy. Security cameras, powered by AI, analyze movement patterns and flag any anomalies before they escalate into incidents. While all this is happening, a predictive maintenance system, embedded in the building's infrastructure, detects a minor irregularity in the plumbing and issues an alert. A costly pipe burst has just been prevented. This scenario might feel futuristic, but it's closer to reality than ever.

Honeywell recently published findings from its AI in Buildings study, which polled 250 U.S. building managers and senior decision makers across building types including offices, hospitals, airports, schools, universities, hotels and data centers. To participate in the research, respondents had to use AI-enabled property management systems in buildings with more than 250 occupants.

One of the key findings: 84% of commercial building decision-makers plan to increase their use of AI in the coming year. As AI becomes more prevalent, building managers are focusing specifically on three critical areas: maintenance, security and energy efficiency.

Predicting problems before they start

One of the most significant transformations AI brings is in predictive maintenance. Maintenance in buildings has been a mostly reactive process in the past, where systems are repaired only after they fail, but AI flips this model on its head, using sensors and data analytics to anticipate issues before they occur. Honeywell's AI in Buildings study found that 60% of organizations have already integrated AI-driven maintenance, recognizing its potential to prevent failures before they happen.

While any building can benefit from AI-driven maintenance, it's larger, more complex infrastructures that gain the most. For facilities like hospitals, hotels, government buildings and commercial real estate, even modest energy savings and reduced downtime can help justify the investment in AI technology.

Creating safer, smarter spaces

AI is also reshaping how buildings approach security, making them safer and smarter at the same time. 63% of respondents to Honeywell's AI in Buildings study indicated that they use AI to detect unusual behavior and identify potential threats before they escalate. More than half of respondents use AI-driven tracking systems to improve emergency response, ensuring a faster, more coordinated approach to safety.

Biometric access controls have also gained traction, with 45% of respondents to the study relying on AI to regulate entry and prevent unauthorized access. These intelligent systems analyze data in real time, all to strengthen security measures and maintain seamless access for occupants.

Enabling buildings to use only what they need

Picture an AI-driven HVAC system that automatically reduces power consumption in an unoccupied office wing or adjusts lighting on real-time daylight levels. More than half of the study's respondents use AI for energy management, optimizing systems such as lighting, temperature and water consumption based on real-time conditions. Adaptable control systems that optimize performance are more important than ever as buildings evolve.

"*Buildings are living organisms. What today is a copy center, tomorrow could be a small data center or large conference room. All three of these use cases have remarkably different control needs. Since they are always evolving, the controls in those buildings need to be both flexible and intelligent,*" said Dave Molin, President of Building Management Services at Honeywell.

Preparing teams for the AI wave

While AI enhances automation and efficiency, it does not replace human oversight. A noteworthy challenge in AI adoption is the skills gap among building management professionals. According to the AI in Buildings study, 92% of decision-makers reported difficulty finding tech-savvy professionals skilled enough to navigate this new technological environment.

Rather than expecting instant perfection, it's important to understand that AI systems adapt over time through experience and data. The solution is upskilling existing workers with workforce training and empowering employees to thrive alongside AI technology.

Building managers looking to implement AI effectively will benefit most by collaborating with trusted technology partners who can guide them through this ever-changing landscape. Instead of mastering every technical detail, managers and their teams can focus on embracing an open mindset and approaching AI as an intelligent assistant that complements human skills.

Building managers looking to implement AI effectively will benefit most by collaborating with trusted technology partners who can guide them through this ever-changing landscape. Instead of mastering every technical detail, managers and their teams can focus on embracing an open mindset and approaching AI as an intelligent assistant that complements human skills.

www.honeywell.com
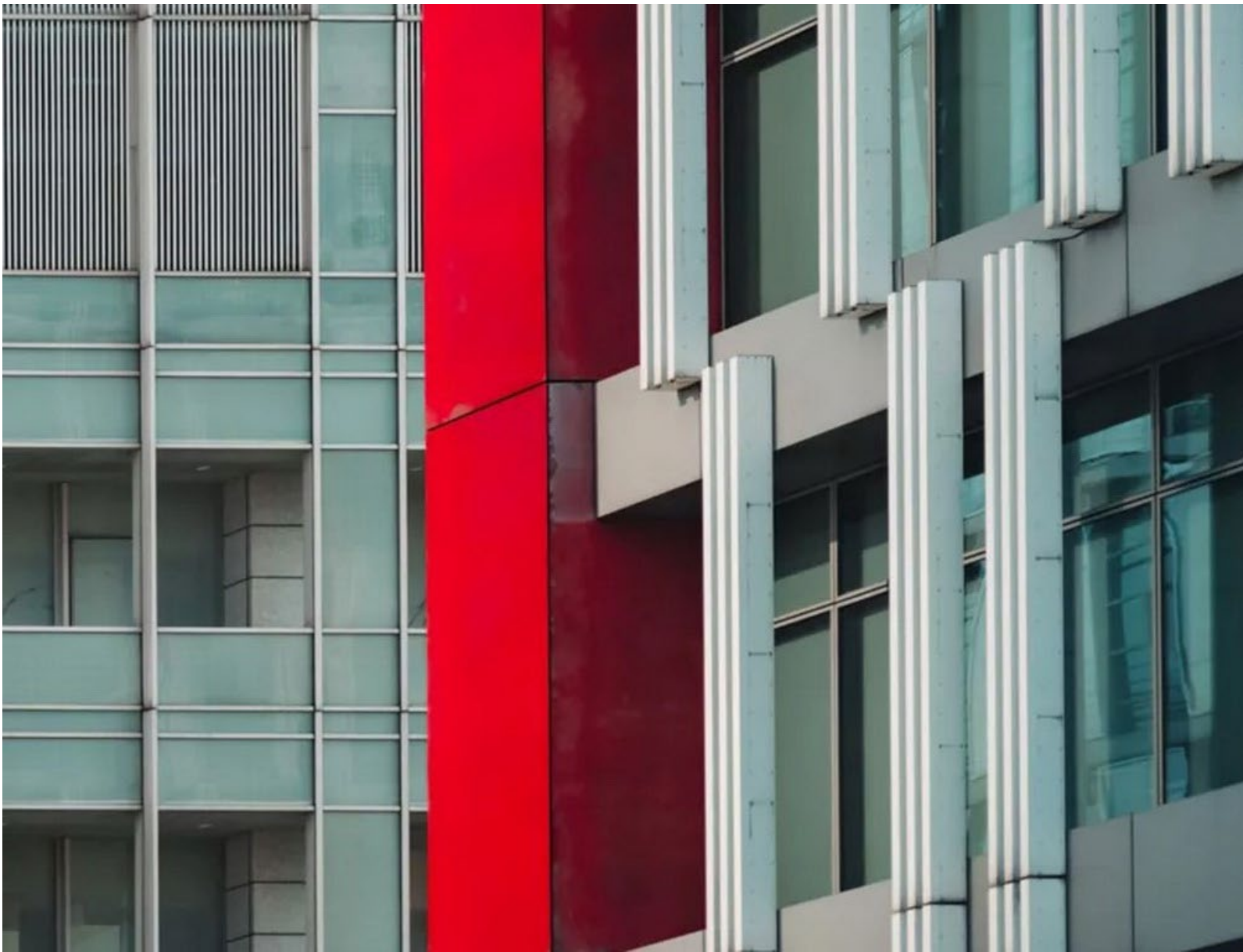
Honeywell
THE POWER OF **CONNECTED**

MORE INFORMATION

MORE INFORMATION

INDUSTRIAL VISION HARNESSES AI

By Youssef Belgnaoui
Editor-in-Chief of Automation France

Youssef BELGNAOUI, explains how industrial visual inspection applications can leverage the potential of artificial intelligence (AI) tools.

Industrial vision systems have long been deployed in production to perform inspections aimed at detecting anomalies, contaminants, and other irregularities in manufactured products. Traditionally, image processing relied on predefined, rule-based programming, which artificial intelligence (AI) now makes it possible to overcome. AI, and in particular deep learning, enables industrial vision to take a new step forward. It complements and sometimes surpasses rule-based vision systems in complex, unpredictable, or information-rich environments that are difficult to model manually. Thanks to its learning capacity, AI paves the way for a new generation of industrial vision applications.

Traditional industrial vision
Industrial vision systems are based on digital sensors integrated into industrial cameras equipped with specific optics to capture images. These images are then transmitted to a PC or to an embedded controller in the camera, so that dedicated software can process, analyse, and measure different characteristics for decision-making. Such vision systems perform very well with uniform parts of consistent quality. They use rule-based algorithms, processed step by step, which are more economical than large-scale human inspection. On a production line, a vision system configured in this way can inspect hundreds or even thousands of parts per minute. The results of these visual data are based on a fixed rule programming approach to solve inspection tasks. Rule-based vision works effectively with a known set of variables: the presence of a part, the distance between objects, the position of a component to be picked up by a robot. These operations are relatively easy to deploy on an assembly line in a controlled environment.

This method is well suited to controlled contexts, where parts are homogeneous, well positioned, and tolerances are consistent. It can inspect hundreds or even thousands of parts per minute with the required level of reliability. However, as soon as the environment becomes more complex — variations in shapes, lighting, textures, positioning — rule-based image processing systems reach their limits. Subtle defects, organic objects, or products with high variability cannot easily be described using fixed rules. When inspection tasks become too complex, deep learning provides a relevant alternative. Generally speaking, the more intuitive a task is for a human based on a simple image (without measurement tools), the more likely it is to be automated through AI.

AI and industrial vision: a data-driven approach
Deep learning uses an example-based rather than a rule-based approach. By leveraging neural networks to teach a computer what constitutes a good image based on a reference dataset, deep learning can analyse, locate, and classify objects, or even read printed markings. When unpredictability and natural variations are inherent to the process, deep learning technology comes into its own.

Artificial Intelligence techniques, particularly Deep Learning, are thus transforming the design and implementation of industrial vision systems. Unlike the symbolic approach, which requires manual definition of characteristics to monitor, AI-based systems learn to recognise patterns and make decisions from sets of annotated images.

In this supervised model, data becomes the central element. Annotated images — for instance, "*OK part*" vs. "*defective part*" — are used to train a neural network. The network automatically extracts discriminative features and learns to generalise this knowledge to new cases. This process drastically reduces the need for manual coding and enables domain experts (quality, production, healthcare, etc.) to directly contribute to application development by annotating data, without requiring programming skills.

The introduction of Edge Learning systems makes it possible to train and run models directly on embedded processing units within the cameras, eliminating the need for a PC or GPU.

Advantages of AI for industrial vision applications
• Flexibility and adaptability: unlike fixed rules, AI models can adapt to natural variations in production (appearance, position, lighting, etc.).

• Simplified development: no need to manually define detection criteria; the system learns by example.

• Ability to handle complex cases: AI is suitable for detecting aesthetic defects (scratches, dents, texture variations) that are difficult to model using rules.

• Reduced implementation time: models can be trained using only a few dozen or hundreds of examples.

• Robustness to drift: models can be updated to take into account natural changes in the production environment.

Key AI applications in industrial vision
• Aesthetic inspection: detection of scratches, dents, and irregularities on complex or reflective surfaces.

• Complex object recognition: identification of objects in unstructured or organic environments (e.g. agriculture, food industry, healthcare).

• Reading markings and characters: OCR on irregular or worn surfaces.

• Product classification: distinguishing between different variants or categories of a product, even with subtle differences.

• Element localisation: precise positioning despite variations in shape or background.

IDS NXT industrial cameras are specifically designed to support AI-based image processing.

HOW TO DEPLOY AN AI-BASED MACHINE VISION APPLICATION

By Youssef Belgnaoui
Editor-in-Chief of Automation France

O n production lines, quality control by camera can now rely on image processing tools powered by artificial intelligence techniques. While traditional vision systems implemented tools based on fixed rules, AI now makes it possible to detect subtle defects, adapt to part variability, and anticipate production drifts. Here

This wide array of tools reflects the evolution of the market: alongside deep learning software platforms designed for engineers, there are now smart cameras capable of combining traditional vision tools with AI, using "*point-and-click*" graphical interfaces accessible to users with no programming skills. These systems lower the entry barrier,

AI makes it possible to detect subtle defects, adapt to part variability, and anticipate production drifts.

are some key principles to follow when deploying an AI-based machine vision application. It all starts with a clear definition of the problem to be solved. Is the goal to identify microcracks invisible to the naked eye, check assembly positioning, or sort products based on their appearance? This first step determines all the ones that follow: how data is collected, the choice of camera, hardware architecture, and even the type of algorithm selected. A poorly defined objective inevitably leads to an ineffective training process — like teaching an operator to recognize a defect without ever explaining what makes it a defect.

Image collection is at the heart of the project. Contrary to common belief, it's not enough to accumulate a large number of photos: they must accurately represent the real conditions of inspection. This often means capturing images using the same camera and lighting setup that will be used in production. The images should reflect the full variety of possible cases: conforming parts, defective parts, batch variations, and lighting differences. This is called "*locking*" the scene — stabilizing physical parameters so the AI doesn't have to compensate for unnecessary variations.

Neural Network Training
Once the data is collected, the next step is to train the neural network. Several options are available. Companies can leverage the processing power of dedicated GPUs or specialized integrated circuits (ASICs) to accelerate performance, or outsource this stage to the cloud to avoid investing in expensive hardware. Some integrated solutions even allow the model to be trained directly within the camera, without an intermediate PC, reducing data transfers and simplifying deployment.

but they do not eliminate the need for domain expertise. It's still the knowledge of the industrial process, the parts, and the types of defects that guides dataset construction and results validation.

Image Processing
Integration into the production line typically follows two approaches: processing the image as close to the source as possible, directly inside the camera ("*Vision at the Edge*"), or sending it to an industrial PC or cloud server. The first reduces latency and infrastructure requirements; the second offers greater flexibility for more complex analysis. In both cases, the system must communicate with existing PLCs and automation systems through standardized interfaces, so inspection results can trigger appropriate actions — line stoppage, product sorting, or operator alerts.

The final step is validation. Before full deployment, models must be tested on real parts and under varied scenarios. Performance matrices, which show how the AI classifies good and defective parts, help evaluate reliability and identify weak spots. This phase, often carried out as a pilot project, provides an opportunity to refine the model, expand the image database, and confirm that the system meets the original requirements.

A Well-Structured Process
Deploying an AI-powered machine vision application is neither a simple matter of assembling hardware nor a domain reserved for data scientists. It's a structured process in which each step — defining the objective, collecting data, selecting tools, training the model, integrating the system, and validating the outcome — plays a critical role in overall success. While technology has evolved to make some tasks more accessible to non-specialists, a rigorous approach and clearly defined goals remain the real drivers of performance.

MORE
INFORMATION

By Youssef Belgnaoui
Editor-in-Chief of Automation France

OVERVIEW OF AI-BASED VISION SYSTEMS
ON THE MARKET

A brief overview of ready-to-use vision solutions available on the market that implement AI-based image processing tools. Written by Y. Belgnaoui.

According to their manufacturers, implementing AI-based vision systems does not require specific expertise. It is enough to present the camera with a greater or lesser number of reference images. AI image processing techniques aim to detect defects and irregularities in products during production that were previously difficult or even impossible to identify using traditional image processing methods.

AX Smart Cameras from Baumer
The AX Smart Cameras from Baumer, designed for industrial use, are equipped with the NVIDIA Jetson platform which, in addition to a GPU, also provides ASICs specifically designed for AI in the form of DLA Cores (Deep Learning Accelerator). They capture up to 300 images per second for AI-assisted object classification. In addition to AI tasks, they can also be used for traditional image processing. Images can be compressed in JPEG and sent directly to the Cloud to continue training and improve the neural network. Thanks to the Linux-based approach, the programming language can be freely chosen depending on the application, and third-party image processing libraries or APIs (Application Programming Interfaces) can be used. The computing power of the NVIDIA Jetson AI modules, the system's openness, and the use of established standards, allowing programmers to easily leverage existing AI libraries, tools and models, are all intended to facilitate the deployment of vision-based inspection applications.

When data processing takes place directly in the camera, as is the case with AX Smart Cameras, this is referred to as Vision at the Edge. Deploying Edge Processing reduces bandwidth compared to the traditional camera-to-PC system and reduces the amount of hardware required,

The AX Smart Cameras integrate Nvidia Jetson AI modules and Sony CMOS sensors with a freely programmable image processing platform.

The In-Sight 3800 system comes with vision tools based on AI-powered Edge Learning technology combined with traditional rule-based algorithms.

Users can train the Smart-VS sensor with a few sample images, without any specific expertise.

such as industrial PCs, cables, or interface cards. The Smart Cameras feature various standards-compliant interfaces such as Ethernet, RS232, USB 3.0, and HDMI. This gives users greater flexibility in system design, communication within the system and with other systems, and data exchange.

Cognex In-Sight 3800 Vision System
The Cognex In-Sight 3800 vision system is designed for high-throughput production lines. It combines a set of vision tools, image processing capabilities, and software into a fully integrated solution suitable for a wide range of inspection applications. "*The In-Sight 3800 offers processing speeds twice as fast as previous systems,*" said Lavanya Manohar, Cognex Vice President of Vision Products. The system includes vision tools that leverage AI-based Edge Learning technology and traditional rule-based algorithms. Edge Learning tools solve tasks of varying complexity and can be configured in just a few minutes using a handful of sample images for training. Rule-based tools, in turn, allow for deterministic tasks with specific parameters.

"*When we chose Cognex, we expected the processing time of the In-Sight 3800 to be 30% lower than that of the In-Sight 7900 vision system we currently use,*" said Nicolas Chomel, Director of Technology Development at Sidel, a packaging machine supplier. "*However, during qualification tests, the In-Sight 3800 proved to be 50% faster in our application!*"

IDS NXT Malibu Camera
The IDS NXT Malibu cameras are industrial devices that enable real-time AI overlays in video streams. These cameras are the result of a collaboration between IDS and U.S. semiconductor manufacturer Ambarella. They feature AI-powered image processing capabilities directly embedded into the camera through Ambarella's vision-on-chip (SoC)

The In-Sight 3800 is powered by the In-Sight Vision Suite software, a platform common to all In-Sight products, which includes two programming environments: EasyBuilder and Spreadsheet. With its intuitive point-and-click interface, the EasyBuilder environment guides users step-by-step through the development process. Meanwhile, the spreadsheet-style interface allows for fine-tuning of work parameters in advanced or highly customised applications.

Datalogic Smart-VS Sensor
The Datalogic Smart-VS is particularly suited to detecting the presence and orientation of labels and caps on bottles. Thanks to artificial intelligence, the sensor learns the distinctive features of an object from just a few sample images. Without specialised knowledge, users can train the sensor in a few simple steps. According to its manufacturer, the sensor can be installed in just a few steps and requires no technical expertise. With its built-in AI, the sensor learns distinctive features from a small number of examples. Even process and product variations, such as different products within the same batch, tasks, strong reflections, moving or flexible parts, can be learned by the sensor with just a few mouse clicks. The sensor offers a measurement range of 50 to 150 mm, a push-button for configuration, and uses an LED display to indicate Good/Bad for detected parts. It features an Ethernet interface for point-to-point communication, a push-pull switching output (NPN/PNP), and a supply voltage of 10–30 VDC.

The NXT Malibu camera integrates Ambarella's vision-on-chip system to leverage AI-based image processing capabilities.

system. Image analyses can be performed at over 25 frames per second and transmitted to peripheral devices as overlays in compressed video streams via the RTSP protocol. Thanks to the integrated image processing pipeline, data from the onsemi AR0521 image sensor is processed directly within the camera. Functions automatically adjust parameters such as brightness, noise, and colour.

"With IDS NXT Malibu, we have developed an industrial camera capable of analysing images in real time and embedding results directly into video streams," explained Kai Hartmann, Head of Product Innovations at IDS. *"The combination of on-camera AI, compression, and streaming opens new application scenarios for intelligent image processing."*

This was made possible through close collaboration between IDS and Ambarella, combining their expertise in industrial and consumer technologies. *"We are proud to collaborate with IDS, a specialist in industrial image processing,"* said Jérôme Gigot, General Manager of Marketing at Ambarella. *"IDS NXT Malibu represents a new class of AI-compatible industrial cameras, delivering fast inference times and high image quality thanks to our CVflow AI vision SoC."* IDS provides all the components — from cameras to its AI Vision Studio — required across the entire workflow: from image capture and dataset labelling to neural network training and on-camera execution.

Keyence IV3 Series Vision Sensor
Unlike conventional models, the IV3 Series vision sensor with integrated AI automatically determines optimal image capture conditions thanks to its AI, specifically designed for presence and difference checks. Installation is simple: the operator only needs to define the target part and register at least one conforming (OK) and one non-conforming (NG) image. No specific knowledge is required for configuration. The all-in-one system includes both a lens and lighting, eliminating the need to select these components separately, and provides immediate results. No high-performance PC is needed: adjustments are made using a small amplifier equipped with a CPU. The compact head (24 × 31 × 44.3 mm) offers a wide installation distance range from 50 to 3000 mm, while the maximum field of view of 2730 × 2044 mm enables wide-angle detection for diverse applications.

With its compact head (24 × 31 × 44.3 mm) and 330° rotating connector, the IV3 Series vision sensor can be installed in equipment where space is limited.

The IV3 Series vision sensor is particularly suitable when the detection zone is small but the system needs to be installed at a distance to avoid obstructing operators or robots. Long-range detection also allows the camera to be positioned away from splashes during painting or welding processes. With its 330° rotating connector, the sensor adapts to any type of space and setup, ensuring maximum installation flexibility.

Mitsubishi Electric Melsoft Vixio Software
Mitsubishi Electric recently launched Melsoft Vixio, an AI-based visual inspection software designed to automate camera-based inspection processes, aiming both to improve manufacturing quality and to address labour shortages. *"As part of our industrial automation systems strategy, we tackle the key challenges facing modern society,"* said Toshie Takeuchi, President of Mitsubishi Electric's Factory Automation Systems Group. *"Production line automation is accelerating due to labour shortages, yet many visual inspections are still performed manually. Through Melsoft Vixio, we aim to better meet customer needs for AI-based visual inspection."*

The Melsoft Vixio suite is designed to reduce the workload associated with manual visual inspections, improve defect detection, and enhance product quality. It also seeks to bridge the gap between novice and experienced inspectors. By supporting new operators in their judgement and decision-making, AI aims to address skill gaps in identifying irregularities and defects in manufactured products. The software conducts visual inspections in coordination with external devices such as cameras. All the functions required for deploying a visual inspection system can be set up without programming. Inspection date and time, PLC data, captured images, and inspection results are automatically linked and stored to facilitate traceability.

The Melsoft Vixio software enables visual inspection in coordination with external cameras. All vision system functions can be implemented without programming.

Sick Inspector83x 2D Vision Sensor
With its integrated lighting unit, the Sick Inspector83x 2D vision sensor is an all-in-one solution. Offering resolutions of up to 5 MP and powered by a quad-core processor, it is designed to carry out AI-based inspections directly on the device. No external machine control is required. Typically, up to 15 inspections per second can be performed for industrial

The Inspector83x vision sensor can perform up to 15 inspections per second for defect and anomaly detection in production.
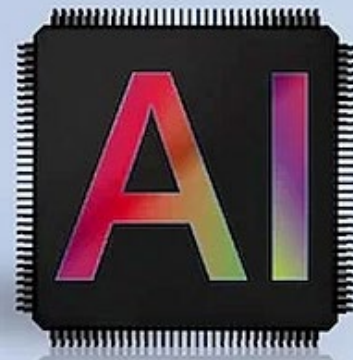
vision applications such as defect and anomaly detection or classification.

This sensor can perform industrial vision inspections across multiple industries, including consumer goods manufacturing, food and beverage production, automotive, and packaging. Colour imager models will be launched during 2024 to expand the range, enabling inspection of colour-specific features for sorting, defect detection, and colour-based quality control.

With its pre-installed software, the vision sensor is ready to use immediately. According to Sick, no vision experts or laborious preparation are required to set up an application. Using a standard computer connected via the camera's USB-C or network interface, users are guided by the intuitive interface to present sample parts under real production conditions, then perform training and inspection. Just five sample images are enough. By combining AI capabilities with traditional rule-based tools — for example, to add a simple measurement — inspections can be pragmatically configured.

According to Sick, this sensor removes much of the complexity of conventional machine vision, especially when product or packaging design changes are needed. Instead of contacting a vision specialist or external consultant to configure new rule-based inspections, non-specialist operators can simply add a new product example, and the camera autonomously learns the task.

For more complex scenarios involving large datasets and numerous samples, users can access the dStudio Cloud Service to configure their own neural networks, which can then be exported in lightweight format to the Inspector83x. With Sick Nova, advanced users can also refine their solutions through custom developments using Lua and Halcon programming. The cloud-based dStudio service also facilitates collaboration and data management among colleagues.

Once installed, image inference is performed directly on the vision sensor, and results are transmitted to the machine controller as "OK/NOK" outputs or sensor values. The sensor is optimised for data transfer to industrial networks with dual ports for EtherNet/IP™ or Profinet integration. A dedicated high-speed Gigabit Ethernet port ensures the transfer of high-resolution image data, data logging, or TCP/IP integration. An integrated export function also generates customised configurations for the most common API types at the press of a button.

The sensor includes seven inputs and five outputs. Its built-in pulse delay and queue functions synchronise camera image outputs according to time or encoder pulses, activating connected machine controls, such as triggering an ejector.

Although designed to operate fully autonomously, a range of accessories is available if the application requires them. A dedicated lighting connector can be used with external light sources such as backlights or light bars. A near-infrared (NIR) version will also be available in 2024. Using a standard C-mount thread, users can choose from Sick's range of lenses as well as custom optics to meet the needs of more complex inspections.

●●●

HOW ACE AND KEYTEC FACILITATE ERGONOMICS AND MANPOWER OF TOOLING MACHINES

Linear actuators and industrial gas springs now work hand in hand on the hoods of the butting machines to lift ergonomics and safety for personnel to a new level

One of KeyTec Netherlands B.V.'s machine rooms in Sittard with butting machines for the production of metal pins for battery production

KeyTec Netherlands B.V. and ACE Stoßdämpfer GmbH collaborate to streamline metal pin production, ensuring worker safety and minimizing downtime.

According to the motto *"We Industrialize Your Ideas!"*, KeyTec has been supporting customers from all over the world with high-precision metal parts and plastic components from small to mass-volume quantities since 1999. As a business-to-business supplier, the company implements a wide range of product solutions for the automotive, energy and consumer goods industries as well as for commercial customers at its headquarters in Sittard in the Netherlands. The spectrum ranges from individual parts and multi-technology products to subassemblies and assemblies. This also includes their surface treatment and assembly through metal stamping, bending and deep drawing as well as plastic injection molding and related technologies.

Partners from Prototype to Series Production
As a privately owned family business, KeyTec works in a project-oriented manner with fast means of communication and quick response to customer questions. In the production facilities and subsidiaries in the Netherlands, the Czech Republic and China, the focus is on design for manufacturing, short turnaround times and close cooperation with selected European and Asian tool manufacturers and partners for automation equipment. This also includes the technical sales team of ACE Stoßdämpfer GmbH, which has been based in the Netherlands for more than 15 years and is responsible for the Benelux countries. The synergies with manufacturers and partners such as ACE serve all of KeyTec's end customers in terms of time-to-market, total cost of ownership, quality and efficiency.

This pragmatic and solution-oriented approach is used daily by KeyTec's creative and experienced staff in all customer challenges to industrialize products and assemblies. The company is certified according to IATF 16949, ISO 9001 and ISO 14001 and convinces with future-oriented solutions, as the following application proves.

Wanted: More Ease of Use in Metalworking
For various customers from the electronics industry, KeyTec carries out certain work steps for the production of batteries. These are equipped with special pins, of which around one billion pieces are produced per year in three-shift operation in various designs at the headquarters in Sittard. This requires machines that convert wire both swiftly and precisely, at the same time ensuring uniform quality with high productivity. Processing is done from the coil, with straightening, cutting and cold forming taking place in the machine. Every eight hours, once per shift, these machines are supplied with new material by the operating personnel. To do this, the upper hoods of the machine, which weigh around 45 kg, have to be opened. This is also necessary on a regular basis when the tools of the machines have to be cleaned. In the rare event of machine failures, the hoods have to provide fast access to the machines and their levers and clamping jaws and the bushing-tool systems as well as to the cross slides and heads inside.

An important reason for the considerable weight of the hoods is that the closed machine housing is supposed to effectively insulate the work noise for occupational health and safety reasons. In addition, the integrated drives, as well as the electronics and central lubrication, should be easily accessible to the maintenance team from all sides. Among other parts, two industrial gas springs are responsible for this on each hood. Provided by ACE, these ready-to-install, maintenance-free and sealed type GS-28-200-EE-920N

components are durable and filled with pressurized nitrogen gas. With an extension force of originally 920 Newton (N) per gas spring, they reliably supported the muscle strength of the operating personnel when opening and closing the hoods. From the point of view of increased ergonomics and to further relieve the burden on employees, KeyTec's technicians asked ACE's sales engineers in the Netherlands about other ways to improve operating comfort and to modernize the existing tooling machines in a smart way.

Found: Industrial POWERISE® in Combination with Existing Gas Springs
Han Titulaer from the Benelux sales team then mentioned ACE's affiliation with Stabilus Group and presented the electromechanical drive systems called Industrial POWERISE®. For many years, similar components provided by Stabilus have been reliably performing their services millions of times as actuators on tailgates as well as on engine and trunk hoods in a wide variety of models of the best-known automobile manufacturers.

Adapted and perfected for industrial use in recent years by the technical teams at ACE and Stabilus, these components are therefore also suitable for the 45 kg hoods on the tooling machines in Sittard – in combination with the gas springs already installed. Using their extension forces, which were reduced to 700 N per unit by reducing nitrogen via ACE's valve technology, the team identified IPR35-V-24A-200-

Robin Hilke, PM IPR - credit: ACE

ACE industrial gas springs are perfectly sealed, maintenance-free components made in Germany and, in combination with the new actuators from ACE, ensure that even higher loads than before can be lifted or lowered in a controlled manner without any effort.

Industrial POWERISE® drive systems are available with spindle pitches between 2 and 25 mm and open up new application possibilities for designers through easy integration and convenient operation.

8-65C actuators as the most suitable components for this specific case to increase operator comfort.

Once mounted and optionally powered via a 12 or 24 volt connection, these Industrial POWERISE® reliably enable stroke movements of 200 mm in length at spindle pitches of 8 mm per revolution at the touch of a button. In this case, lifting and lowering takes place with an additional force of 65 N per actuator in combination with the gas springs. Ralf Küppers from Technical Sales and Robin Hilke, ACE's Product Manager for Industrial POWERISE®, set these exact values on site at KeyTec, whereby the electrical control system could also be precisely adapted to the machine hoods via analogue interfaces.

In general, the new actuators from ACE are available with spindle pitches between 2 and 25 mm and then take over lifting, lowering and positioning optionally with forces between 250 N and 4,000 N. With stroke ranges between 50 mm and 350 mm, designers can thus choose precise as well as powerful and versatile vertical and horizontal motion control. What's more, this solution can operate as an automatic positioning system for their applications too. Since the noise level of the drive is only 55 dB (A), Industrial POWERISE® also enables quiet operation. These advantages make the integration of ACE's new drives perfect for flaps, hoods and vertical linear adjustments.

In the application described here, it proves to be a further advantage that the combination with ACE gas springs relieves the drive, which means that the weight can be

higher, the movement by hand more ergonomic and the travel speed faster. In practice at KeyTec Netherlands B.V. in Sittard, this is synonymous with easier operation, faster access to the machine's interior and greater satisfaction of all parties involved with the quality of work processes and the reduction of noise.

**Industrial POWERISE® IPR35: The New Class of Linear Actuators**
Industrial POWERISE® is not only recommended in this case as a new class of electromechanical drive systems for motion control that is as convenient as it is powerful. These unique drives ensure safety and comfort in various other industrial applications and facilitate maintenance at the same time. This innovation is based on the IATF-certified drive of the Automotive POWERISE® from Stabilus, the parent company of ACE, global OEM No. 1 when it comes to actuators for tailgates, engine and trunk hoods of cars and SUVs.

In addition to the electric movement, designers and users benefit from other proven features such as maintenance-free use or convenient manual adjustment. In combination with world leading gas springs of Stabilus Group, Industrial POWERISE® offers an equally unique combination of dynamic force and load balancing in addition to a product range that is probably singular in the market. The control system was developed by Stabilus especially for POWERISE® and is manufactured in Germany. It allows automatic control of two POWERISE® actuators at the same time, with a choice of three different operating modes, namely push-and-hold in typing mode, automatic single push at the touch of a
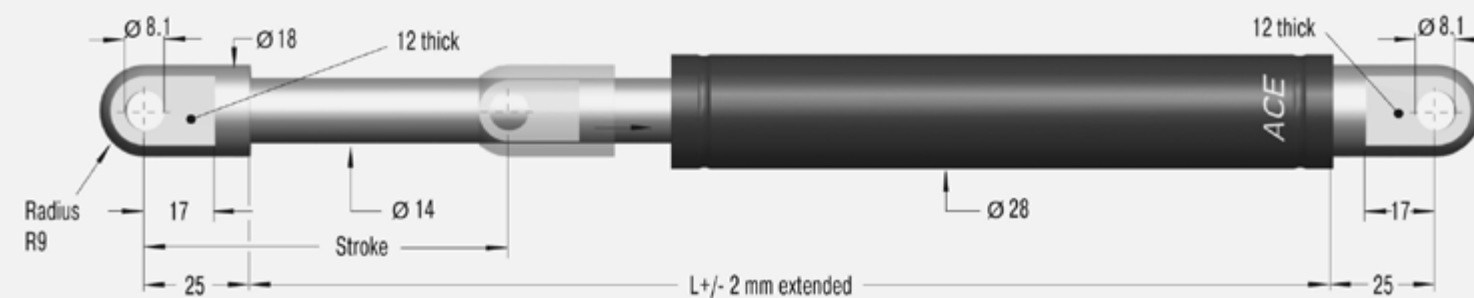
button and tip-to-run when manual movement is to be triggered.

The modular system can be individually configured and easily adapted, with ACE working in partnership to develop the exact right solution for customer requirements during application development. Industrial POWERISE® is available immediately from stock in Langenfeld, Germany, from single quantities up to any desired number.

"*Sensitive obstacle detection was important to our partners at KeyTec Netherlands B.V., which we set up together via our software. We assumed an estimated force of 30 N at the leading edge when the hood was closed. This detects obstacles such as fingers or hands, and the movement stops within milliseconds before injury or damage occurs.*"

Robin Hilke, Product Manager Industrial POWERISE®, ACE Stoßdämpfer GmbH

Author
Robert Timmerberg M. A., Special Interest Journalist (DFJV), plus2 GmbH, Düsseldorf

www.ace-ace.com

HUTCHINSON EXPERTISE IN SEALING FOR INDUSTRIES

HUTCHINSON®

HIGH PERFORMANCE SEALING FOR INDUSTRY

A s an expert in sealing and a global rubber specialist for 170 years, Hutchinson Precision Sealing Systems designs and manufactures tailor-made solutions for complex industrial environments: aerospace & defense, e-mobility, railway, nuclear, energy, and off-road. Thanks to its expertise in elastomer compound formulation, Hutchinson controls the entire value chain, from materials R&D to production at its 22 international sites.

Our multi-material expertise applies to the most extreme environments, on land, at sea, and in the air. Innovation, responsiveness, and a cross-functional vision guide our teams in creating smart solutions for safer, more comfortable, and more sustainable mobility.

Our sealing solutions, O-Rings, flat seals, shape seals, shaft seals, compact and cellular rubber guarantee optimal performance in the face of high pressures, extreme temperatures, vibrations, or aggressive fluids. The compounds are developed in compliance with technical and environmental standards, ensuring traceability and conformity.

We also offer connected solutions such as the DYMEO® inductive sensor, which can be used to control rotary movements with high precision or measure instantaneous speeds, and Zaltex composite panels, which are resistant to cryogenic temperatures and fire and are used in LNG ships. Committed to a strong environmental approach, Hutchinson aims to reduce its greenhouse gas emissions by 50% by 2030, achieve carbon neutrality by 2050, and obtain ISO 14001/50001 certification for all its sites. The group promotes eco-design through its internal resolutions® and revea® labels, dedicated to sustainable solutions and recycled or bio-based materials.

https://precisionsealingsystems.hutchinson.com/en/

At Hutchinson, we design tailor-made sealing solutions for the most demanding industrial environments.

Since 1853, Hutchinson has been supporting key industrial sectors such as aerospace, defense, rail, energy, and electric mobility. Our expertise in multi-material technologies, our ability to develop customized solutions, and our global production footprint have made us a trusted partner in sealing systems.
We address extreme constraints high pressures, severe temperatures, vibrations, and aggressive fluids by mastering every step of the value chain, from material formulation to manufacturing.

Find out more

MORE INFORMATION

WHAT YOU SHOULD KNOW ABOUT RFID TAGS

The data stored on an RFID tag is read by a dedicated reader and transmitted to specialized software for processing. (Source: Murata).

RFID (Radio Frequency Identification) tags are used for asset recognition through digital encoding technology. These tags use an antenna, an electronic chip, or an integrated circuit to send and receive data. Written by Y. Belgnaoui.

RFID (Radio Frequency Identification) technology operates through a radio wave exchange between a reader and the tag, which contains a chip and an antenna. The reader emits a radio signal that the tag's antenna captures to activate it. The tag's chip, powered by this signal, then transmits the stored information (such as a serial number or tracking data) back to the reader, enabling contactless and remote identification.

The RFID tag market is segmented by tag type, frequency band used, and targeted application. There are two main categories of RFID tags: active and passive. The key difference between a passive and an active RFID tag lies in their power source. Passive tags have no battery. They are powered by the electromagnetic field generated by the reader, which limits their read range to a few centimeters up to about ten meters. Active tags, on the other hand, contain a built-in battery that enables them to transmit their own signal. As a result, they offer a much longer reading range, often several dozen meters, reaching up to 100 to 150 meters.

Tags can operate on low frequency (125 kHz to 134 kHz), high frequency (13.56 MHz), and ultra-high frequency (850–960 MHz). The frequency directly impacts detection range and reading speed, as well as the ability to read through materials and handle radio signal collisions. High frequencies (UHF) provide longer range but are more sensitive to metal interference, whereas low frequencies penetrate materials more effectively and offer greater precision for close-range reading.

RFID tags are specifically tailored to several industries such as manufacturing, agriculture, animal tracking, retail, healthcare, logistics and supply chain, security and access control, transportation, and more.
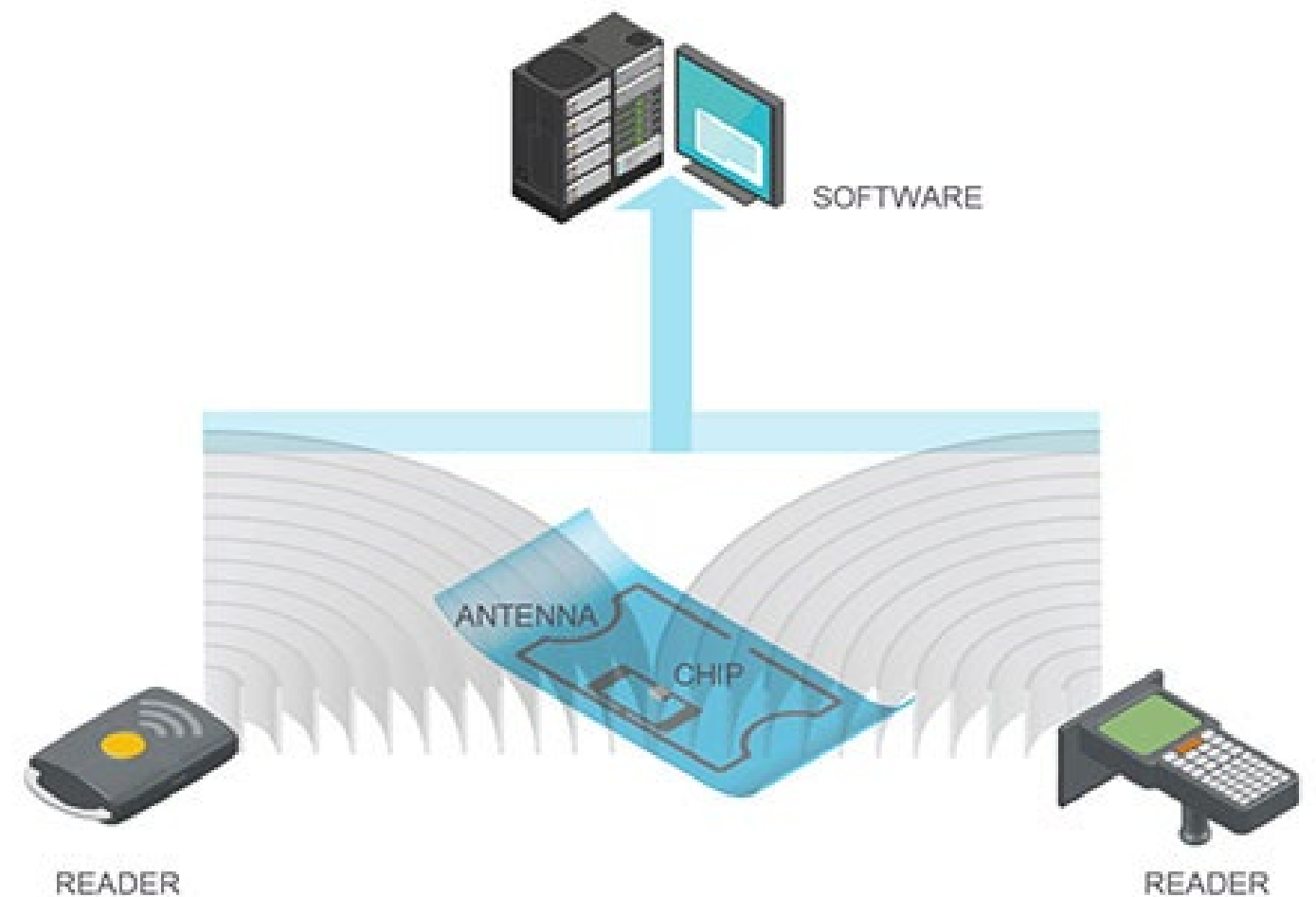
The data stored on an RFID tag is read by a dedicated reader and transmitted to specialized software for processing. (Source: Murata).

According to a study on the RFID tag market published by Allied Market Research, the RFID tag market has experienced significant growth in recent years due to increasing demand across multiple sectors. This growth is largely attributed to the need for better inventory management, enhanced supply chain visibility, and optimized asset tracking systems.

The adoption of RFID technology in sectors such as manufacturing and logistics has played a major role in the expansion of the RFID tag market. RFID tags provide real-time visibility of goods across the entire supply chain. This tracking capability improves process efficiency, increases productivity, and reduces operational costs. In the manufacturing sector, RFID tags are used to monitor components and finished products, reinforcing stock control and optimizing quality management processes. These markers also improve shipment tracking and enable more accurate deliveries, thereby reducing the risk of loss or misplacement in logistics operations.

However, RFID tag performance can be affected by environmental factors. For example, metallic interference can disrupt radio wave transmission, which is critical to RFID functionality—especially in metal-heavy environments. Liquids, particularly water, can absorb radio waves and reduce tag performance in humid or liquid-rich areas. Additionally, extreme temperatures can damage the electronic components of RFID tags or shorten battery lifespan. To overcome these challenges, more robust and specialized RFID solutions may be required. These are often more complex and costlier.

The integration of sensors into RFID tags represents a major advancement. This evolution allows RFID tags not only to locate and track objects but also to collect and share additional data such as temperature, atmospheric pressure, and humidity levels. This is a significant advantage in sectors like logistics and supply chain management, where monitoring sensitive products—especially perishable goods or healthcare items—is essential during storage and transport.

RFID tags equipped with sensors can also deliver real-time information on the operation of production machinery, helping to ensure their proper functioning. In agriculture, these tags can detect environmental parameters, making crop management easier. The integration of sensing capabilities into RFID tags positions them as highly effective tools for advanced data collection and analysis.

MORE INFORMATION

MORE INFORMATION

NEW LEUZE IT 1960 MULTI-PURPOSE HAND-HELD SCANNER SERIES WITH SUPERCAP TECHNOLOGY

Easy to tell apart: Battery-powered devices are charged via a contact (left), while supercap devices are charged inductively (without contact, right).

Leuze

The IT 1960 hand-held scanner series from Leuze sets new standards with supercap technology, a generous reading field, optimized illumination, high resolution as well as wired and wireless models

Leuze has developed a new combined table-and-wall mount for wireless devices with battery or supercap. This base station can be flexibly mounted either on a wall or table.

The IT 1960 hand-held scanner series from Leuze sets new standards with supercap technology, a generous reading field, optimized illumination, high resolution as well as wired and wireless models.

With innovative supercap, battery-free charging technology the devices are lighter easier to handle and the reading processes has been optimized meaning devices now scan up to 20 percent faster and the contrast tolerance for faint codes is 15 percent higher. Scanning is also made easier by the integrated green LED aimer with target point and the wide-area white light illumination. Supercaps can be used for tens of thousands of charging cycles. Supercaps (supercapacitors) offer extremely short charging times and are around three to four times more durable than non-rechargeable batteries and rechargeable lithium-ion batteries.

Super lightweight thanks to supercap
and reliable energy availability compared to conventional batteries. A supercap stores energy by holding electrical charges in a special double layer, allowing it to release the energy when needed. The wireless supercap devices in the IT 1960 series weigh just 220 grams with no batteries required. The lightweight multi-purpose hand-held scanners are ideal for single scans: Scan, plug into the charging station, and after a few seconds the hand-held scanner is ready for use again. Another advantage is their long service life. Supercaps can be used for tens of thousands of charging cycles. They are around three to four times more durable than non-rechargeable batteries and rechargeable lithium-ion batteries.

Equipped for every requirement
For maximum flexibility, Leuze also offers multi-purpose hand-held scanners with battery or cable (three or five meters long) in the IT 1960 series. These are ideal for performing numerous scanning processes in a short period of time. The practical base station for the wireless devices with battery or supercap can be attached either to the wall or to the table. For even more convenient use, Leuze has

optimized the scanner's housing ergonomics. Scanning is also made easier by the integrated green LED aimer with target point and the wide-area white light illumination.

Data via radio or cable
The hand-held scanners in the IT 1960 series are particularly suitable for reading bar codes in clean, dry environments and at room temperatures between 0°C and 50°C. They comply with protection class IP52 or IP41 depending on the model. The reading range is up to 728 millimeters. This allows scanning processes to be carried out from a medium distance, for example when scanning larger goods or groups of goods. Users benefit from the series' wide range of

interfaces: From PS/2 to USB and RS232 to Bluetooth, there are many connection options to choose from. The multi-purpose hand-held scanners can be easily configured using parameter codes or the accompanying software.

www.leuze.com

MORE INFORMATION

MORE INFORMATION

ADVANCING 3D SENSOR FUSION WITH AU-ZONE
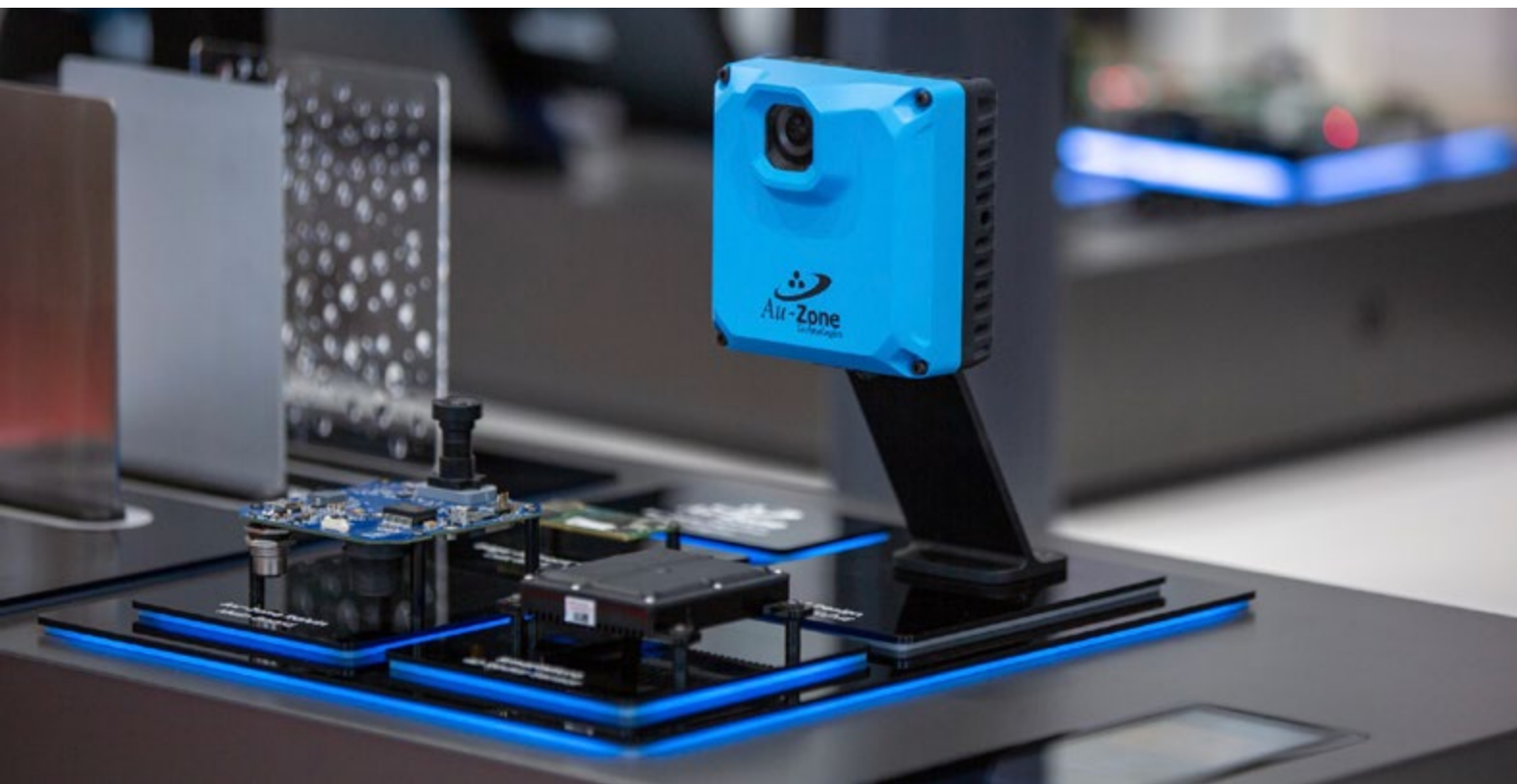
NXP and Au-Zone introduce the Raivin, a production-ready 3D sensor fusion module combining radar, vision, and AI for robust real-time edge perception.

Dusty construction sites. Fog-covered fields. Crowded warehouses. Heavy rain. Uneven terrain. What does it take for an autonomous machine to perceive and navigate challenging real-world environments like these – reliably, in real time? Together with Au-Zone Technologies, we set out to build a perception system that performs under operational stress but is fast to integrate and easy to scale.

The result: the Raivin module, a 3D perception system that fuses radar sensing, vision processing and edge AI inference into a single, production-ready unit. Designed for operational complexity, the Raivin enables machines to process and act on complex environmental data in real time.

With pre-trained AI perception models and a unified hardware-software stack, the Raivin simplifies the deployment of intelligent perception, marking a step forward in bringing scalable autonomy to the edge.

Challenge: Overcoming Traditional Perception Limits
The push toward autonomy and physical AI is outpacing the readiness of traditional perception solutions. Many still rely on single-sensor stacks that falter in complex, unpredictable environments.

• Camera-only systems degrade in low visibility and poor lighting

• LiDAR is precise but costly and power-hungry

• Radar is reliable in poor weather but lacks resolution for precise object classification

Together with Au-Zone, we set out to solve the problem — co-developing an edge AI sensor fusion system designed to deliver high-confidence, low-latency perception.

Vision delivers rich semantic understanding: object detection, classification and segmentation. Radar adds continuous depth and motion tracking, even through obscured environments. Fused with AI inference, these signals form a synchronized, context-aware 3D model of the world. This enables real-time decision-making with a high degree of confidence.

But even with the benefits of multi-sensor systems, autonomous applications are still limited by how quickly they can respond to real-world stimuli. Latency matters, and these workloads can't tolerate delays caused by cloud processing or slow sensor refresh rates.

Only by combining radar and vision with edge AI processing in one unit could we deliver a system fast enough, reliable enough and robust enough to meet the demands of next-generation autonomy.

Solution: A Full-Stack System for Edge Deployment
From the start, the Raivin was a co-development effort. A full-stack design process where every layer, from silicon to software, was developed collaboratively to deliver unified performance at the edge.

The Raivin Module is a commercially available AI perception solution that provides low-level radar cube and vision data processing with edge AI into a single, deployable unit.

Au-Zone's Edge AI Software Stack and Development Tools
The Raivin module was developed using Au-Zone's EdgeFirst Studio™, a platform that simplifies multimodal data collection, AI-assisted labeling, training, validation and deployment, without requiring deep ML expertise.

Within EdgeFirst Studio, the EdgeFirst Perception Stack helps developers accelerate sensor fusion design through pre-trained models and a workflow-optimized environment. Teams can label datasets, fine-tune models and validate performance within a single toolchain, significantly reducing development time and lowering the barrier to entry.

The result is a tightly integrated 3D perception system optimized for low latency, low power and ready for deployment in an edge environment.

Results: Trusted Performance in Real-World Conditions
The Raivin was put to the test in a live demo replicating the types of environmental stressors autonomous machines face every day, from weather and motion to visual obstructions:

• In fog, radar maintained object detection, tracking and spatial awareness

• In glare, the fusion engine maintained accurate object tracking
• In simulated rainfall, radar and AI worked together to retain accurate perception
• In cluttered scenes, radar tracked velocity, while AI and vision segmented and classified people, equipment and obstacles in real time

What's Next: Simplifying Sensor Fusion at Scale
Historically, sensor fusion has been complex, requiring fragmented tools, custom pipelines and deep domain expertise. The Raivin changes that.

With pretrained AI models integrated into Au-Zone's EdgeFirst Studio, engineers can implement radar and vision integration without starting from scratch. The software supports dataset management, training and validation, enabling fast iteration with minimal coding or ML infrastructure. It can also be used as a data collection platform to explore custom solutions for different objects and working environments.

The ready-built hardware solution is optimized for edge AI processing, eliminating concerns about custom implementations and hardware tradeoffs.

The Raivin is already commercially available, giving OEMs a validated 3D perception system that can scale. Whether deployed in mobile robots, precision agriculture or fleet vehicles, the Raivin module enables fast integration of AI-powered perception through a single platform.

www.nxp.com

FLIR UNVEILS C8 NEXT-GENERATION COMPACT THERMAL IMAGING CAMERA

Electrical/Mechanical Maintenance, Building Diagnostics and Vehicle Inspection Professionals All Set to Benefit from the Rugged, Easy-to-Use Flir C8.

Flir, a Teledyne Technologies company, launched the C8 thermal imaging camera, a new device set to enhance compact thermal diagnostics with high-clarity, rapid results. Improvements to the new-generation C8 include enhanced image quality, higher accuracy, improved sensitivity, and the addition of advanced reporting templates within Flir Ignite Pro.

Traditional thermal inspections can be slow, unclear, and hard to document, relying on manual processes that risk overlooking critical issues. The result of these inefficiencies can lead to higher maintenance costs, delayed repairs, and reduced productivity. The Flir C8 solves these challenges with a rugged, easy-to-use form factor that puts powerful, high-resolution thermography into the hands of users, ensuring accurate, efficient, standardized inspections. In addition, technicians can integrate FLIR Ignite Pro cloud connectivity and newly devised advanced reporting templates that not only streamline workflows and save time but also support easy collaboration.

Get a Clear View
New capabilities for the Flir C8 include 320 x 240 thermal resolution and 35° horizontal field of view to increase the number of pixels on the target and enhance image clarity. In combination with Flir's patented MSX® detail enhancement technology, sharp thermal images become the norm, in turn supporting faster fault and anomaly detection for more accurate diagnostics.

"Users of our C8 can enjoy up to 40-50% quicker inspections, helping to cut labor and downtime costs," revealed John Gould, Director – Global Business Development – Condition Monitoring. *"Identifying faults faster and acting sooner reduces expensive outages and unplanned repairs, while confidence in consistent, reliable results is assured thanks to high resolution and high thermal sensitivity. Furthermore, isotherm alarms instantly highlight when temperatures cross set limits, helping users quickly identify potential issues".*

Reporting for Duty
Offering an easy way to document and share findings with others, C8 users can cut their reporting time by 20-40% through integration with Flir Ignite Pro. This secure cloud storage and reporting software for professional thermographers means technicians can automatically upload inspection images to the cloud for processing and analysis.

Connected workflows through automatic cloud uploads and purpose-built report templates speed documentation and sharing while eliminating manual steps and any potential for data loss. Users can subsequently focus on problem solving rather than paperwork.

Compact and Rugged
A durable, easy-to-handle form factor meets industrial standards for drop (2 m, 6ft 7") and ingress protection (IP54), ensuring the C8 is ready for demanding operating environments. Applications include:

• Electrical and mechanical maintenance activities: Inspection professionals can quickly take advantage of the Flir C8 to detect faults and issues in factories, process plants, commercial facilities, and utilities to prevent downtime and extend equipment life.

• Building diagnostics: Users can perform thorough inspections of electrical systems, HVAC components, plumbing systems, and structural elements to identify hidden problems and improve building performance. The Flir C8 is ideal for restoration projects.

• Vehicle inspection: Technicians can easily inspect engines, exhaust systems, and other hard-to-reach automotive components to detect wear and potential failures before they escalate. Those tasked with electrical vehicle diagnostics are also set to benefit from the new-generation C8, which features a 5MP visual camera with digital zoom.

Intuitive Interface
Notably, the intuitive, user-friendly 3.5" touchscreen interface empowers users of all skill levels to perform expert inspections.

Also new to Flir's latest-generation C8 compact thermal imaging camera is increased accuracy of ±2°C @ 0°C to a newly elevated 450°C maximum object temperature. Higher sensitivity (NETD <50 mk) and streaming over USB are further additions to the extensive list of capabilities.

The Flir C8, which carries a 2-year battery warranty and 10-year detector warranty, comes complete with wrist strap lanyard, pouch, and USB Type-C cable.

www.flir.com

MITUTOYO INTRODUCES QM-FIT: A SMART VISION SYSTEM FOR FAST, INTUITIVE MEASUREMENT

QM-Fit is a compact, stand-alone unit with an integrated PC, 15.6-inch touch monitor, and a 20MP CMOS camera offering 100x digital zoom, telecentric lens, and 36 mm depth of field for high-resolution imaging and precise focus on uneven parts.

M itutoyo, global leader in precision measurement solutions, is proud to announce the launch of QM-Fit, a compact, high-performance manual vision measuring machine designed for quick, accurate inspection of small and thin components. QM-Fit redefines ease of use with a smart, touch-based interface and is positioned as a next-generation alternative to traditional profile projectors.

A Smarter Way to Measure
QM-Fit is built to make precision measurement accessible to everyone—regardless of skill level. With its intuitive User Interface, touch panel operation, and advanced automatic part recognition, users can simply place a part on the stage and initiate measurement instantly. The system automatically detects features such as circles and edges, and offers real-time, graphical feedback.

Key Advantages & Efficiency Highlights

Instant Measurement with Automatic Recognition
QM-Fit offers instant measurement with automatic recognition, allowing users to simply place the part on the stage. The system immediately identifies the workpiece, detects circles, lines, and other elements without the need for setup, alignment, or manual focusing, and begins measurement right away.

Intuitive Operation—No Skills Required
Its intuitive touchscreen interface ensures that no special skills are required to operate the system. Visual guides and auto-suggestions minimize training time and reduce user errors, while results are displayed graphically in real time with clear pass/fail indicators.

Graphically Supported Caliper Snap
Another standout feature is the Graphically Supported Caliper Snap, which enables fast and precise measurement by snapping digital rulers to part edges or geometries—

eliminating the time-consuming crosshair alignment used in traditional projectors.

Higher Throughput, Lower Costs
QM-Fit also improves productivity and reduces costs by delivering repeatable results with minimal operator influence, cutting down on variation and rework. Automatic detection and digital zoom shorten cycle times, helping to remove bottlenecks in quality control and first-article inspection processes.

Compact, Space-Saving Design, Powerful Optics & High-Resolution Imaging
With its compact, space-saving design (366 × 407 × 621 mm and 25 kg), QM-Fit fits easily on any workbench and operates as a true stand-alone unit, complete with integrated PC and 15.6-inch touch monitor. Its powerful 20MP CMOS color camera, digital zoom up to 100x, telecentric lens, and 36 mm depth of field provide high-resolution imaging and accurate focus even on uneven parts.

Reliable and Traceable
Finally, the system ensures reliability and traceability, with calibration to ±10 μm accuracy and repeatability within 2σ ≤ 4 μm. Built-in traceability functions and environmental correction further enhance measurement confidence.

A Better Alternative to Profile Projectors
While traditional projectors require manual alignment and operator skill, QM-Fit automates these steps with smart detection and digital visualization. It delivers faster, more consistent results, making it an ideal replacement for optical comparators in quality control, incoming inspection, and shop floor applications.

www.mitutoyo.eu

OGP ANNOUNCES LARGE CAPACITY SMARTSCOPE M130 M-SERIES
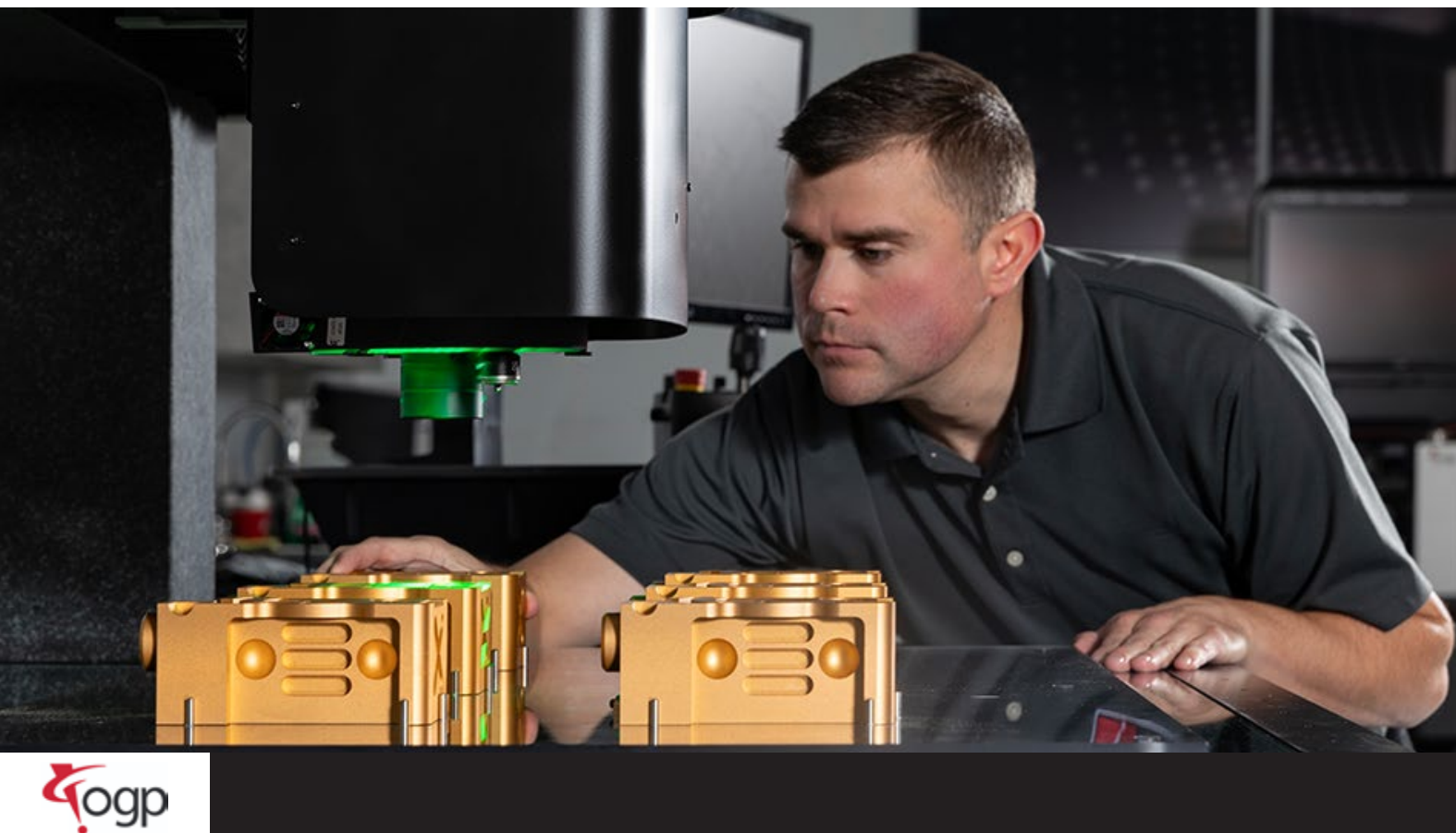
SmartScope M130 introduces next-gen enhancements in image accuracy, optics, and throughput for manufacturers producing large, heavy parts.

Optical Gaging Products (OGP®), a world-leading manufacturer of optical and precision multisensor metrology systems for industrial quality control, is proud to announce the newest addition to the next evolution of SmartScope® 3D Multisensor Metrology systems: SmartScope M130.

For leading manufacturers crafting large, heavy parts, SmartScope M130 ushers in the next generation of enhancements in image accuracy, optics, and throughput in a new large format 3D multisensor video measurement platform.

Tim Fantauzzo, VP North American Sales, remarked, "*The SmartScope M-Series family has quickly been adopted by manufacturers seeking unrivaled confidence in repeatability and reliability. Larger parts obviously can contain many more detailed features. The M130 optical system is truly telecentric with no distortion, so manufacturers making large, heavy parts can achieve more accurate measurements particularly at low magnification with far more part features in the field of view.*"

At the core of SmartScope M130 is the patented* IntelliCentric-M Optical System, featuring fixed optics with a 20-megapixel camera and proprietary VIRTUAL ZOOM™ technology. Built from the ground up at OGP headquarters in Rochester, NY, the streamlined IntelliCentric-M optics employ a variety of exclusive technologies allowing for instant magnification changes throughout the same zoom range as a traditional mechanical zoom system, resulting in faster runtime while requiring far less downtime for maintenance.

SmartScope M130 is the ideal choice for manufacturers making large parts that require advanced throughput solutions. The IntelliCentric-M optical system combined with advanced sensors, illumination, and accessories, achieves class-leading optical measurement speeds.

With a robust standard XYZ travel of 790 x 815 x 200 mm, optional 300 or 400 mm Z-axis, and payload capacity of 75 kg (165 lbs), SmartScope M130 offers next-generation M-Series benefits to manufacturers producing large parts. A new innovative base design results in a lower stage height, allowing users to load and unload heavy parts or oversized fixtures with ease.

OGP President Steve Flynn, said, "*Since 1992, OGP SmartScope systems have helped thousands of manufacturers around the world achieve confidence in their quality programs. With SmartScope M130, we've applied the latest evolutions in optics and software in a larger format, creating the next generation of leading metrology solutions for manufacturers making large and heavy parts.*

"*M-Series systems take full advantage of the advanced edge detection algorithms, parallel processing, and routine optimization found in ZONE3 Metrology Software to deliver advanced throughput and enhanced accuracy for manufacturers in any industry. We are excited for our customers producing large parts that have realized these benefits on their compact format M-Series systems, as well as new OGP users alike, to discover how SmartScope M130 will vastly improve their inspection operations.*"

*US Patent Number 12 052 501

www.ogpnet.com

MORE INFORMATION

MORE INFORMATION

LAYER BY LAYER

Test setup for additive manufacturing with the IDS camera U3-3040CP-C-HQ Rev.2.2 and the IDS camera U3-3990SE-M-GL Rev.1.2.
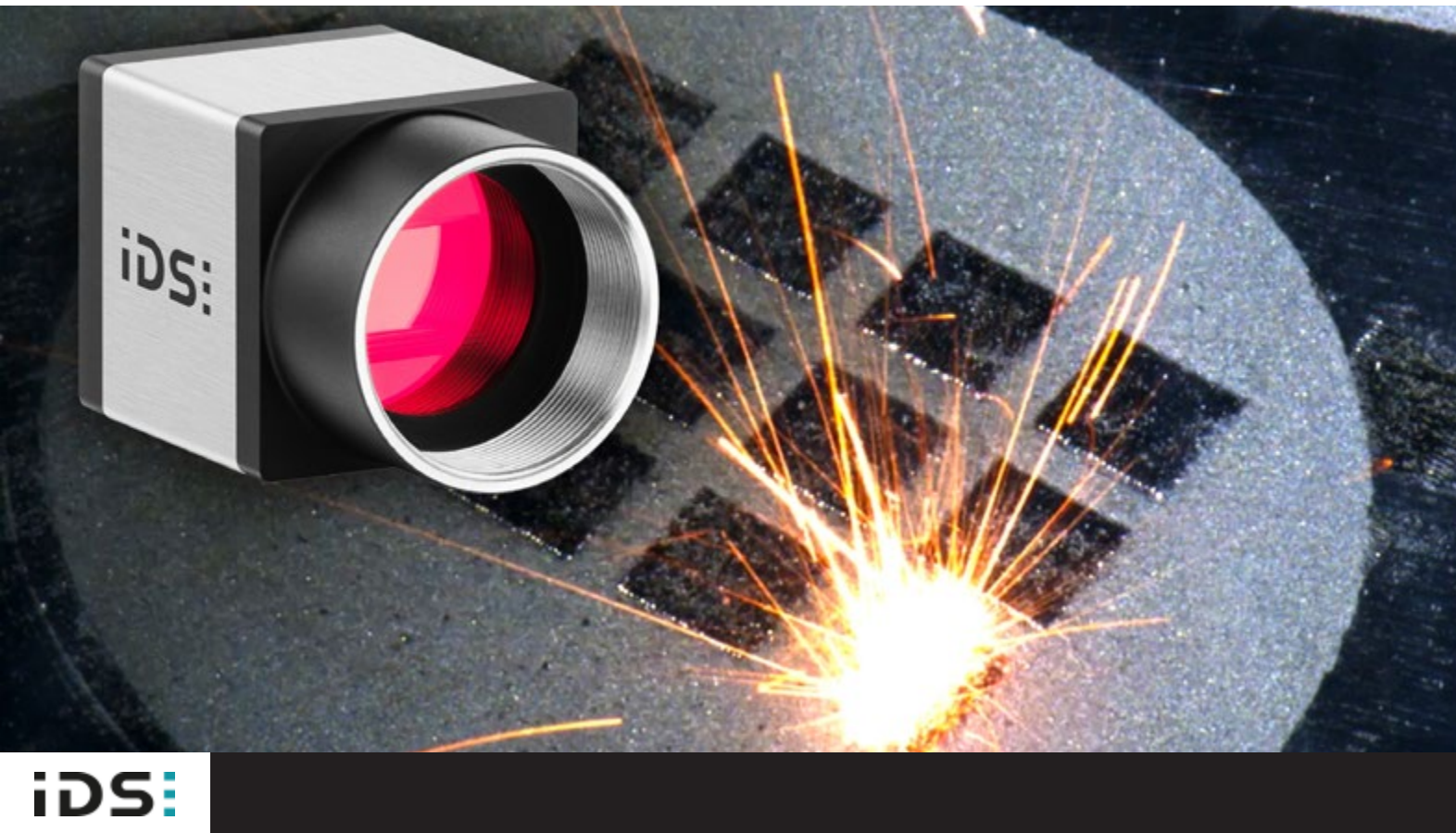
High-precision process monitoring and error detection in additive manufacturing.

P owder bed-based laser melting of metals (PBF-LB/M) is a key technology in additive manufacturing that makes it possible to produce highly complex and high-performance metal components with customised material and functional properties. This technology is used in numerous industries - from aerospace and medical technology to the automotive industry - and is considered groundbreaking for the manufacturing of the future. Advances in process monitoring and control are crucial to further increasing the quality, reproducibility and efficiency of this manufacturing process.

A key challenge is the precise analysis of the layer-by-layer laser melting process, as this has a decisive influence on component quality. As part of research into increasing process stability and efficiency, students and scientific staff at the LaserApplicationCentre (LAZ) at Aalen University are conducting global, dynamic observation of the PBF-LB/M process. In the context of high-speed process control with temperature feedback, phenomena such as spatter and smoke formation, solidification behavior, and the safe movement of mechanical components during additive manufacturing are investigated. This is supplemented by a high-resolution, static analysis of the remelted component layer geometries and precise detection of potential defects

in the powder layers in order to be able to draw well-founded conclusions about the resulting component quality. The imaging components of the research project are two high-performance USB3 industrial cameras from IDS Imaging Development Systems.

Two IDS industrial cameras provide the necessary image information
The two different tasks require different camera models. "*We use a model from the USB3 uEye CP camera family for the global, dynamic observation of the PBF-LB/M process, such as splashes or the formation of smoke. A USB3 uEye camera from the SE series is used for the static, high-resolution identification of anomalies within the powder layers and in the remelted component layer geometries,*" explains David Kolb, research associate at the LAZ.

Requirements for the camera systems
The requirements for the two IDS camera systems are different due to their areas of application in the PBF-LB/M. "*Since powder bed-based laser beam melting of metals is a highly dynamic additive manufacturing process in which the component is generated layer by layer, the following features were particularly important for global, dynamic monitoring: The camera must offer a resolution of more than 1000 x*

Global process monitoring of the PBF-LB/M with different colour and exposure settings using the IDS camera U3-3040CP-C-HQ Rev.2.2 and the IDS peak software.

1000 pixels and a frame rate of more than 100 fps, cover an image field of at least 100 mm x 100 mm and have a trigger port for video recordings," says David Kolb, explaining the choice of camera model. The selected U3-3040CP-C-HQ Rev.2.2 enables excellent image quality even in low light or when the camera should take pictures of fast-moving objects. The integrated IMX273 global shutter CMOS sensor from Sony's Pregius range scores particularly well for its image quality, high sensitivity and wide dynamic range. With a resolution of 1.58 megapixels (1456 x 1088 px), it achieves a frame rate of 251 frames per second - ideal for detailed video and image analyses of dynamic processes.

The video sequence / image shows the layer-by-layer PBF-LB/M process with different laser parameters, recorded with the U3-3040CP-C-HQ Rev.2.2 from IDS using the IDS peak software. "*Depending on the setting of the industrial camera, various process properties such as material evaporation or the quantity and direction of splashes during the PBF-LB/M can be observed and quantified,*" says David Kolb, describing the application. "*The knowledge gained from this provides us with important information to understand the laser-material interactions of the additive manufacturing process in greater depth and to be able to customise the manufacturing parameters depending on the material or, for example, the component geometry.*"

MORE INFORMATION

MORE INFORMATION

Additively manufactured soft magnetic stator half-shell of a transverse flux machine made of FeSi6.5 on a construction platform.

IDS camera

Lens

Cameras
uEye CP - in industry standard format 29 x 29 mm with patented housing design
Model used: U3-3040CP Rev.2.2
Camera family: uEye CP

uEye SE - "*Standard Edition***" /**
All-round industrial camera with universal mounting options
Model used: U3-3990SE-M-GL Rev.1.2
Camera family: uEye SE

To determine the process parameters, cube-shaped components were additively manufactured and the global manufacturing process was analysed using the USB3 uEye CP camera. This made it possible to identify optimum laser parameters with which new types of soft magnetic components for more efficient electric motors of the future can be produced from the difficult-to-process iron-silicon alloy with 6.5 wt.% silicon (FeSi6.5). The stator half-shell made of FeSi6.5 based on this enables ideal adaptation to the special requirements of transverse flux machines thanks to its optimised, three-dimensional magnetic flux guidance. The high electrical resistance of the material and the design freedom of the PBF-LB/M allow a reduction in eddy current losses, increased power density and the integration of additional functions such as cooling structures. Both the complex geometry and the brittle, soft magnetic material FeSi6.5 are almost impossible to produce or process using conventional manufacturing processes and require the use of additive manufacturing technologies.

For static, high-resolution observation of powder layers or component layer geometries, on the other hand, the following camera properties are required in particular - in addition to a trigger port for single image recording: The sensor must be able to detect geometric features below 40 µm in order to identify defects in the layers and offer an image field of at least 100 mm × 100 mm and an image ratio that is as square as possible (1:1). This is exactly what the 20.36 megapixel (4512 x 4512 px) industrial camera

U3-3990SE Rev.1.2 delivers. With the IMX541, it has a high-performance, extremely high-resolution, large-format 1.1" CMOS sensor from Sony's Pregius S series. The BSI technology ("*Back Side Illuminated*") used enables smaller pixels (2.74 µm) and a higher resolution, as well as improved quantum efficiency and sensitivity.

"*Thanks to the particularly user-friendly and flexibly integrable IDS cameras, the necessary adjustments to the test setup could be implemented quickly and easily so that the USB3 uEye SE can be positioned specifically at a defined angle,*" explains David Kolb. The near-vertical observation of the individual powder component geometry layers will provide valuable insights into component quality and potential manufacturing defects once the final adjustments have been completed.
In this way, crucial information about the properties of additively manufactured components can be obtained and used specifically to optimise the manufacturing processes.

Outlook
Research in the field of PBF-LB/M is essential for the development and processing of new material alloys and the production of performance-enhancing, sometimes multi-material component geometries. An in-depth understanding of the process helps to minimise defects and realise innovative designs that would not be possible using conventional production methods. The IDS cameras provide in-depth insights into the PBF-LB/M and thus make a valuable contribution to research, development and
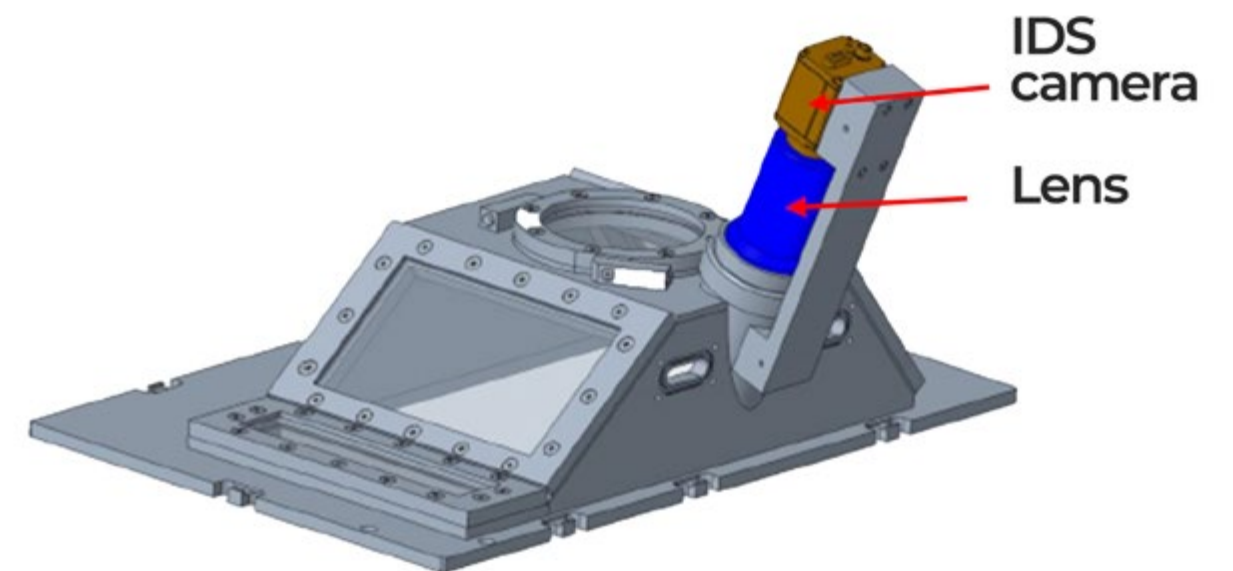
transfer (R&D&T) - for example in the processing of new material alloys or the production of complex, application-optimised (multi-material) components.

In future, artificial intelligence will be used to automatically analyse the dynamic and static observation of the PBF-LB/M. The aim is to gain an even better understanding of the highly dynamic laser-material interaction - such as the number and trajectory of spatter and the formation of process errors - and to further improve the additive manufacturing process in terms of resource efficiency and sustainability.

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

Client
The LaserApplicationCentre (LAZ) at Aalen University is affiliated to the Bachelor's degree programme Process Engineering and Management (PEM) and the Research Master's degree programme Advanced Materials and Manufacturing (AMM) and is part of the Aalen School of Applied Photonics (AASAP). The focus is on research topics relating to laser material processing with a particular emphasis on sustainable production technologies. Innovative topics such as additive manufacturing, the modification of surfaces and volumes as well as joining technologies are being researched. Controlled process management, state-of-the-art measurement technology and machine learning methods are used.

NVIDIA UNVEILS EUROPE'S FIRST EXASCALE SUPERCOMPUTER
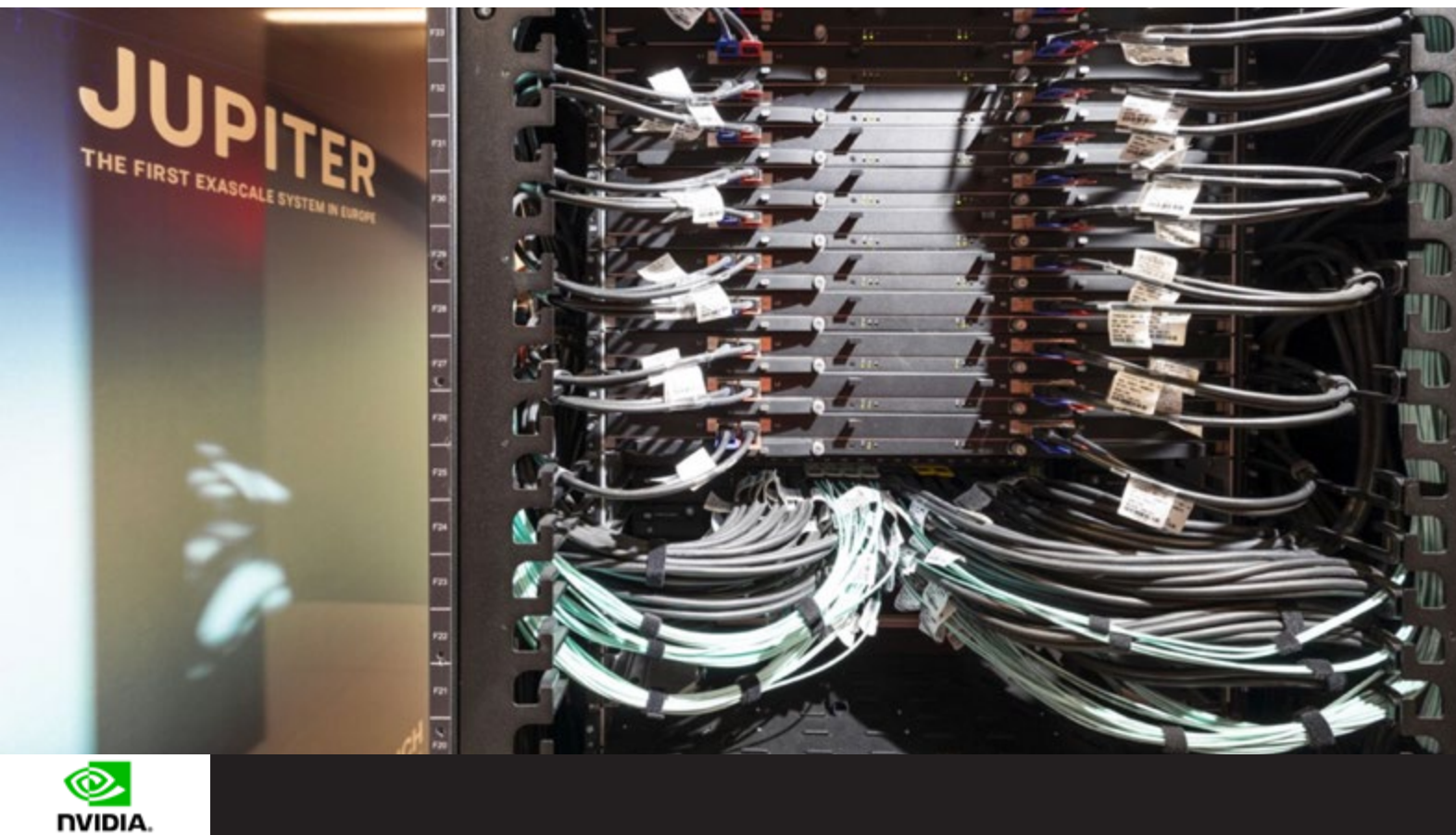
24,000
NVIDIA GH200 Grace Hopper Superchips interconnected with NVIDIA Quantum-2 InfiniBand networking

51,000
Network connections let JUPITER transmit 3x more data than all global data traffic at any given moment

50
Specialized containers comprise JUPITER's modular data center

Nearly
1 exabyte
of storage

JEDI, one rack of JUPITER, is the
#1
most energy-efficient supercomputer

Based on Eviden's BullSequana XH3000 liquid-cooled architecture, JUPITER can run 1 quintillion FP64 operations per second and is expected to offer up to 90 exaflops of AI performance.

The Jülich Supercomputing Centre's JUPITER — Europe's first exascale supercomputer — is officially live.

Unveiled at the supercomputer's inauguration ceremony in Jülich, JUPITER is accelerating innovative applications that are out of this world.

Powered by the NVIDIA Grace Hopper platform, it's enabling breakthrough research in climate, neuroscience, quantum simulation and more.

Based on Eviden's BullSequana XH3000 liquid-cooled architecture, JUPITER can run 1 quintillion FP64 operations per second and is expected to offer up to 90 exaflops of AI performance, delivering more than double the speed for high-performance computing and AI workloads compared with the next-fastest system in Europe.

JUPITER, which stands for "*Joint Undertaking Pioneer for Innovative and Transformative Exascale Research,*" gives European startups, enterprises and researchers a massive leap in computing power so they can quickly, efficiently create breakthroughs in:

• Climate science, including weather prediction and simulation

• Generative AI and large language models (LLMs) for European languages

• Neuroscience, including for drug discovery and mapping the human brain

• Quantum simulation, to bring quantum computing closer to reality

• Along with many other disciplines

For example, Max Planck Institute for Meteorology is using JUPITER to simulate climate predictions with a spatial resolution of about 1 kilometer, depicting extreme weather events such as violent thunderstorms and heavy rainfall much more realistically than before.

The Jülich Supercomputing Centre and a German consortium of nine European partners from research, industry and the media are tapping JUPITER for TrustLLM, a project that's training the next generation of LLMs for various European languages. Such LLMs can ease workflows across virtually every industry by generating humanlike responses and improving productivity.

Neuroscience researcher Thorsten Hater at the Jülich Supercomputing Centre plans to use JUPITER to simulate the behavior of individual neurons on the subcellular level with the Arbor simulator. Such simulations will be crucial for developing therapies to combat neurodegenerative diseases like Alzheimer's.

In addition, JUPITER is poised to break the world record for a supercomputer's ability to handle qubits, the basic units of information in quantum computing. A typical laptop's memory can handle about 32 qubits. The current record on a supercomputer is 48 qubits. An exascale computer like JUPITER could surpass 50 qubits — a significant milestone for quantum simulation.

In Germany and beyond, JUPITER is powering Europe's most challenging research initiatives, helping scale the continent's AI leadership with optimal energy efficiency.

Early flagship projects include:

• Molecular dynamics simulation: The Max Planck Institute of Biophysics will use JUPITER to simulate the nuclear pore complex — the largest protein assembly in cells — to achieve atom-level insights, advance nuclear transport models and combat retroviruses like HIV.

• Multilingual LLMs: With JUPITER, the University of Edinburgh will generate synthetic data to train LLMs that can reason over long documents in any language. More LLMs are being trained through the JUPITER Research and Early Access Program across Europe.

• Particle physics: The University of Wuppertal will use JUPITER to significantly increase the resolution of its microphysical computations, including to study the magnetic moment of an elementary particle, called muon, and potentially discover new particles and interactions.

• Foundation models for video: Using JUPITER, the Ludwig Maximilian University of Munich will develop spatio-temporal compression and diffusion architectures that enable the creation of high-quality, accessible video models to advance applications from medical imaging to autonomous driving.

• Multimodal AI foundation models: The University of Lisbon will tap JUPITER to scale multimodal, multilingual, open language models — integrating concepts from machine learning, sparse modeling, information theory and cognitive science — so these LLMs can support all European languages and address the limitations of existing models.

www.nvidia.com

MORE INFORMATION

MORE INFORMATION

E-CON SYSTEMS POWERS NEXT-GEN EDGE AI WITH NVIDIA JETSON THOR

e-con's ECU with NVIDIA Jetson Thor

New portfolio of AI cameras, Holoscan-ready 10G solutions, and robust ECU platform deliver ultra-low latency, multi-sensor fusion, and real-time compute for robotics, humanoids, and autonomous machines.

e-con Systems®, a global leader in embedded vision solutions, announces support for the newly launched NVIDIA Jetson Thor series, covering a comprehensive range of vision solutions including USB Series, RouteCAM GigE series, 10G Holoscan Camera solutions and robust ECU platform purpose-built for real-time edge AI applications. This strategic expansion enables high-performance, AI-accelerated edge imaging solutions across industries.

NVIDIA Jetson Thor modules deliver up to 2070 FP4 TFLOPS of AI compute, offering a high-performance platform for next-generation robotics and AI-enabled machines. e-con's vision portfolio fully supports Thor's capabilities with multi-sensor fusion, ultra-low latency, and resolutions up to 20 MP—accelerating development in industrial, automotive, medical, and humanoid robotics applications.

e-con Systems' Camera Portfolio for NVIDIA Jetson Thor

As part of its NVIDIA Jetson Thor support, e-con Systems is launching a versatile range of camera solutions across key interface options:

• See3CAM USB Cameras for rapid development and evaluation

• RouteCAM Ethernet Cameras with ONVIF compliance

• Compact 10G e-con HSB leveraging Camera Over Ethernet (CoE) Protocol: Powered by e-con's camera modules and custom designed HSB board with FPGA-based TintE ISP, this solution supports ultra-low latency and various sensors up to 20MP resolution. Camera over Ethernet (CoE) enables direct data transfer to GPU memory with virtually zero CPU utilization, enabling quicker response times and real-time operation.

e-con Systems supports a wide range of sensors—including Sony IMX715, Sony IMX568, onsemi AR0234, Sony IMX900, AR2020 and Sony ISX031—across its Holoscan-ready

solutions, empowering developers to fully leverage the NVIDIA Jetson Thor platform for next-generation AI vision applications.

Robust ECU for Real-time AI at the Edge

Alongside its advanced camera offerings, e-con Systems introduces a compact, production-ready ECU platform with NVIDIA Jetson Thor. This robust compute unit is purpose-built to support real-time reasoning and sensor processing in the field, making it an ideal fit for autonomous mobile robots (AMRs), humanoids, and other AI-enabled machines. It ensures efficient processing of high-resolution imaging data, enabling faster decision-making and deployment in dynamic edge environments.

"*We are excited to bring our latest portfolio of vision and complete compute solutions to the NVIDIA Jetson Thor platform. With support for multiple interfaces, real-time processing, and AI-enabled superior imaging, our Thor-compatible solutions empower developers to accelerate innovation in robotics, autonomous systems, and next-gen edge AI applications. Our compact e-con 10Gbit/s HSB board, featuring a proprietary TintE ISP, enables ultra-low latency imaging and multi-sensor flexibility while efficiently offloading image processing from the NVIDIA GPU—freeing up compute resources and optimizing performance for AI-driven tasks across industries.*" said Prabu Kumar Kesavan, CTO at e-con Systems.

e-con has also outlined a roadmap to extend support for stereo cameras using the same 10G sensor processing board powered by Holoscan Sensor Bridge—ideal for depth-sensing, obstacle detection, and other advanced perception use cases.

Availability

To evaluate the capabilities of NVIDIA Jetson Thor-compatible cameras and ECUs, please visit our online web store and purchase the product.

https://youtu.be/P41dn7oemuQ

www.e-consystems.com

EMERSON HMI/SCADA SOFTWARE ADDS FEATURES TO OPTIMIZE CONNECTIVITY, DEVELOPMENT, AND RUN-TIME PERFORMANCE

Emerson Movicon.NExT v4.4 HMI/SCADA software updates core capabilities and provides new features, with connectivity, development, data management, and performance enhancements so end users, SIs, and OEMs can streamline the creation and deployment of solutions.
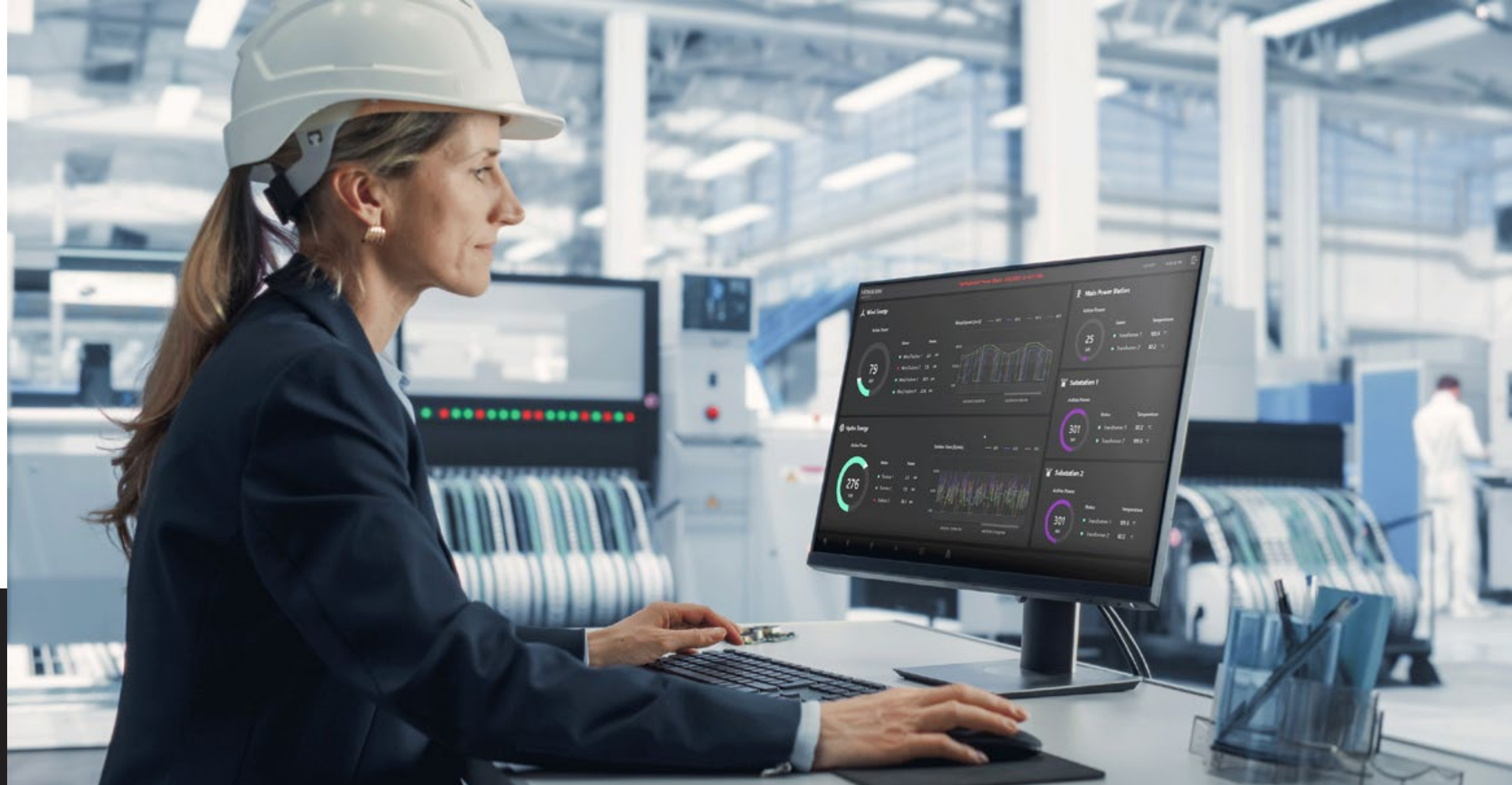
Movicon.NExT Release 4.4 marks a significant evolution of the platform, with performance and user-centric advancements for communications, scripting, development efficiency, data management, and security.

Emerson Movicon.NExT v4.4 HMI/SCADA software updates core capabilities and provides new features, with connectivity, development, data management, and performance enhancements so end users, SIs, and OEMs can streamline the creation and deployment of solutions.

Emerson has announced the release of Movicon.NExT™ Version 4.4, a modern human-machine interface (HMI) and supervisory control and data acquisition (SCADA) platform. Movicon.NExT HMI/SCADA empowers users to create interoperable automation architectures for discrete and process manufacturing applications in the commercial, industrial, and municipal/utility industries. This update delivers enhancements boosting functionality, performance, and flexibility, with an emphasis on user-centric improvements to maximize development efficiency.

Communications and Drivers
Updated industrial communication protocol drivers—for OPC UA, EtherNet/IP, and others—provide support for multi-station, advanced arrays, and more. A new DNP3 driver enables Movicon.NExT HMI/SCADA to integrate seamlessly with power industry and electrical utility networks. Optimized I/O operations more efficiently aggregate read/write tags for greater throughput, and open connectivity helps users easily connect with digital assets.

Scripting and Development
Native support within Movicon.NExT for Python runtime scripting enables custom, cross-platform logic, so developers can create sophisticated strategies while building on proven work. Updated user interfaces, new graphical properties for controls, and streamlined license management (both local and network-based) enhance and simplify the overall user experience, while accelerating project development.

Data Management
New support for TimescaleDB in the historian offers improved storage efficiency and higher performance, especially with large data volumes. Other enhancements increase data precision and SQL database compatibility, while recipe and alarm management are performed through a centralized connection. Movicon.NExT is built to meet the increasing demand for data to support visualization and analytics.

Security and Compliance
A full migration to .NET 8 for core Movicon.NExT applications, and unified and encrypted password management applied across the entire platform, are just two examples of built-in security to help users defend their digital systems and achieve regulatory compliance. CFR21 compliance has now been enhanced with the addition of user group information logged alongside usernames.

An Integration-Ready HMI/SCADA Platform
Additional Movicon.NExT modules, such as Pro.Lean™ and Pro.Energy™, are also revised to v4.4, with updates such as an improved user interface and navigation, new library symbols, and the addition of grouping and overview screens.

The release of Movicon.NExT v4.4 strengthens this HMI/SCADA's position as an open, high-performance, and integration-ready platform, while maintaining a focus on ease-of-use. Movicon.NExT is the foundation of a solid automation architecture, helping end users, systems integrators (SIs), and original equipment manufacturers (OEMs) create innovative automation solutions.

To learn more about the Movicon.NExT v4.4, please visit:
www.emerson.com

MORE INFORMATION

MORE INFORMATION

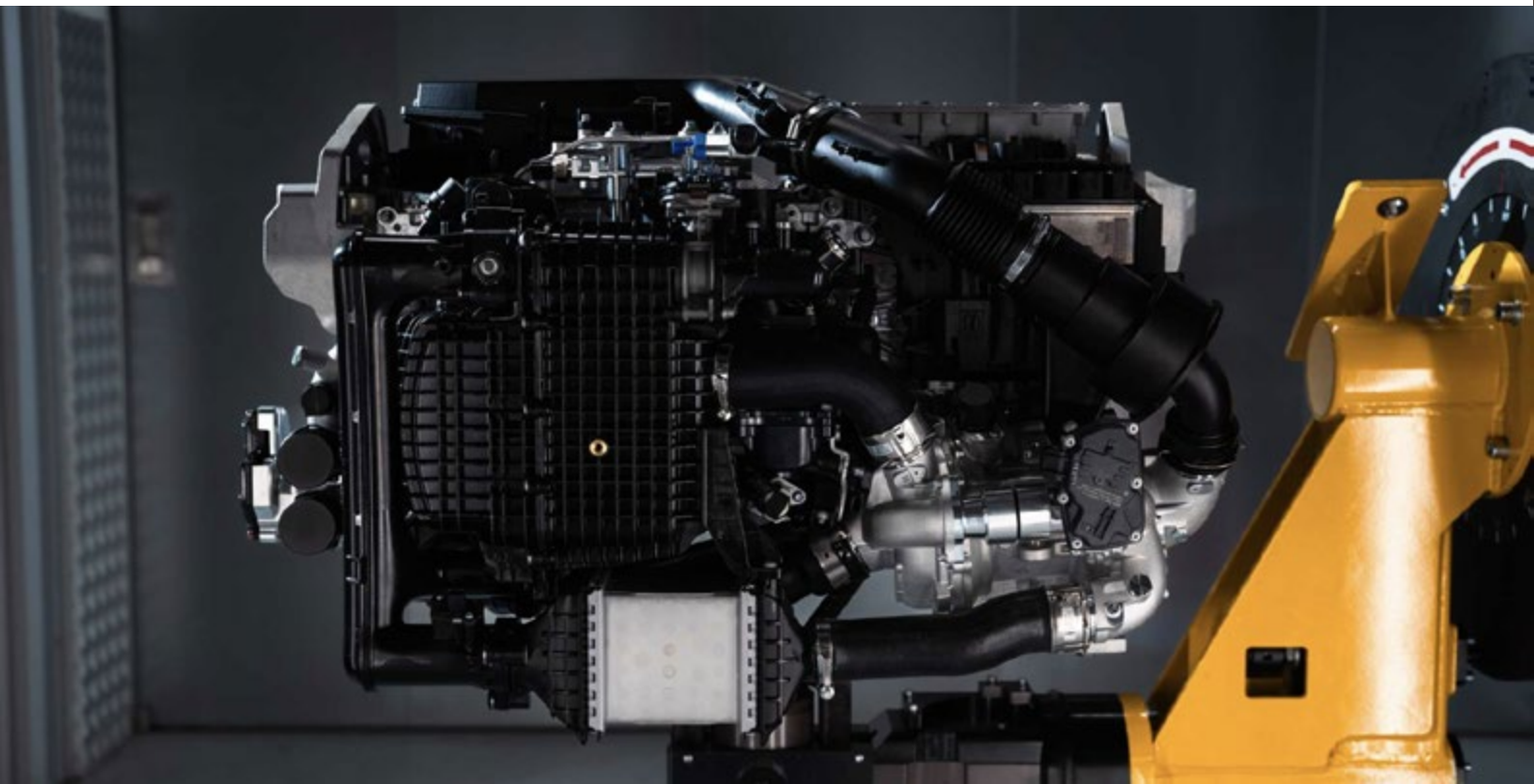# QUALCOMM AND BMW LAUNCH INNOVATIVE AUTOMATED DRIVING SOFTWARE SYSTEM

The AI-enabled Snapdragon Ride Pilot, debuting in BMW iX3, delivers scalable L2+ automated driving with multi-sensor support, global validation, and continuous cloud-driven software updates.

Qualcomm Technologies, Inc. and BMW Group introduced Snapdragon Ride Pilot, the companies' new automated driving (AD) system resulting from a three-year collaborative effort. This state-of-the-art AD system is built on Qualcomm Technologies' Snapdragon Ride™ system-on-chips (SoCs) using the leading-edge Snapdragon Ride AD software stack co-developed by both companies. The system is engineered to meet the highest safety standards and supports AD levels ranging from entry-level New Car Assessment Program (NCAP) to Level 2+ highway and urban navigation on autopilot (NOA) capabilities. Snapdragon Ride Pilot made its global debut today in the all-new BMW iX3, the first production vehicle in BMW's Neue Klasse, and has been validated for use in more than 60 countries with expected expansion to over 100 countries in 2026. Snapdragon Ride Pilot is now available to all global automakers and Tier-1 suppliers through Qualcomm Technologies.

The development of the Snapdragon Ride AD software stack in Snapdragon Ride Pilot is a testament of global collaboration, with over 1,400 specialists from various locations, including Germany, the USA, Sweden, Romania and the BMW AD Test Center in the Czech Republic, working together for three years to bring this technology to life.

"*Our collaboration with BMW's world-class engineering team has been truly transformative, enabling us to build a world-class system that is now available to bring the safety and comfort benefits of automated driving to consumers across all regions and vehicle tiers,*" said Nakul Duggal, Group General Manager, Automotive and Industrial & Embedded IoT, Qualcomm Technologies, Inc. "*Together, we've created Snapdragon Ride Pilot—a revolutionary driver assistance system that prioritizes safety and sets a new standard for the industry. We're excited to see this system come to life in the BMW iX3, supporting BMW's vision for intelligent and safe driving, and we anticipate its widespread adoption will drive a new era of innovation and excellence in mobility solutions.*"

Introducing the Snapdragon Ride AD Software Stack

The Snapdragon Ride AD software stack features a perception stack developed by Qualcomm Technologies and a drive policy engine co-developed with BMW. It is engineered to enable automakers and Tier-1 suppliers to build scalable solutions with flexibility, cost savings and fast time-to-market, with their own drive policy or with a turnkey platform.

The stack is structured into multiple layers including:
• 360-Degree Perception: The system uses a camera-based vision stack for object detection, surround view, lane recognition, traffic sign interpretation, parking assistance, driver monitoring, and mapping. Perception performance is enhanced through low-level perception using bird-eye-view (BEV) architecture and new methods for information extraction from fisheye cameras. The low-level perception between camera and radar is designed to reduce tracking latency, optimize system performance in active safety scenarios, and detect complex urban intersections. To improve computational efficiency, hardware and software co-design along with network architecture search are applied to manage compute resources and memory bandwidth.

• Safety-First Approach: Snapdragon Ride Pilot prioritizes safety through a steadfast commitment to Automotive Safety Integrity Levels (ASIL) and Functional Safety (FuSa) standards, supporting compliance with the latest safety regulations, including NCAP, FMVSS127 and DCAS. Snapdragon Ride Pilot also addresses Safety of the Intended Functionality (SOTIF) and incorporates robust cybersecurity measures, featuring multi-layered encryption and threat detection to help safeguard against potential threats.

• Advanced context-aware driving: Uses a balance of rule-based and AI-based models for behavior prediction and behavior planning to help enable safe handling of complex driving scenarios.

Stack development and testing is supported by the data and simulation factory, a key component of Snapdragon Ride. This toolchain integrates real-world data with synthetic data generation and AI-based simulations to create a robust and diverse set of driving scenarios, enhancing the training and testing of automotive models. The factory's capabilities allow for fast development of automated driving software capable of addressing complex real-world scenarios.

Snapdragon Ride Pilot supports over-the-air (OTA) updates and is fully customizable via the Snapdragon Ride SDK, giving automakers the flexibility to tailor solutions across

vehicle segments. The software stack leverages fleet data to evolve and enable enhanced safety and comfort over the life of the vehicle.

Snapdragon Ride Platform Powers Automated Driving in BMW's Neue Klasse

The ADAS system in the all-new BMW iX3 is built on Snapdragon Ride, which integrates high-performance, automotive-grade systems-on-chip (SoCs) for centralized sensor data processing, advanced computer vision modules for perception, and Snapdragon Ride Automated Driving software stack co-developed with BMW – including drive policy and safety guardrails.

The automated driving system of the BMW iX3 enables advanced capabilities including:
• Contextual lane change and overtaking: the system initiates maneuvers based on subtle driver cues like mirror glances or steering nudges.

• Active lane change and highway assistant: hands-free driving on approved road networks.

• Ecosystem provided AI-powered slot detection parking assistance and camera-based in-cabin monitoring

BMW's "*Superbrain of Automated Driving*" – a central intelligent computer powered by Snapdragon Ride SoCs – combines automated driving functions, offering 20 times higher computing power than the previous generation. The system uses a unified architecture which includes an array of high definition 8M pixel and 3M pixel cameras and radar sensors enabling 360-degree coverage and along with high-definition mapping and precise GNSS localization enables a robust system helping to enable safe and reliable automated driving.

The BMW iX3 is also equipped with Qualcomm Technologies' V2X 200 chipset to support vehicle-to-everything (V2X) communications for enhanced safety. V2X communications allows vehicles to "*see*" and "*hear*" beyond line-of-sight ADAS sensors, helping reduce collisions by uncovering unseen risks through direct communication between vehicles and their surroundings, such as road infrastructure, pedestrians, and other road users.

The Snapdragon Ride Pilot Automated Driving System debuts in the BMW iX3 at IAA Mobility 2025, Hall A2, Booth C01, from 9th September to 14th September 2025.

www.qualcomm.com

HYDROGEN HIGH TECH AT THE BMW GROUP STARTS SERIES PRODUCTION IN 2028

BMW GROUP
Thailand

BMW is developing fuel cell prototypes with hydrogen centers in Munich and Steyr; the Steyr plant will produce third-generation systems, while Landshut supplies key components.

BMW Group Plant Steyr is getting ready for series production of fuel cell systems. The third generation of the BMW Group's hydrogen drive system will be manufactured in Steyr from 2028, and the company's competence centres in Munich and Steyr are already building the first prototypes. Further drive system components will come from the technology hub in Landshut.

"*The launch of the first-ever fuel cell production model from BMW in 2028 will add another exceptionally efficient high-performance drive system with zero emissions to our technology-open product portfolio,*" says Joachim Post, Member of the Board of Management of BMW AG, Development. "*The choice of Steyr as the production location clearly demonstrates our commitment to a European innovation footprint. The BMW competence centres in Munich and Steyr have a key role to play in the development of pioneering fuel cell systems.*"
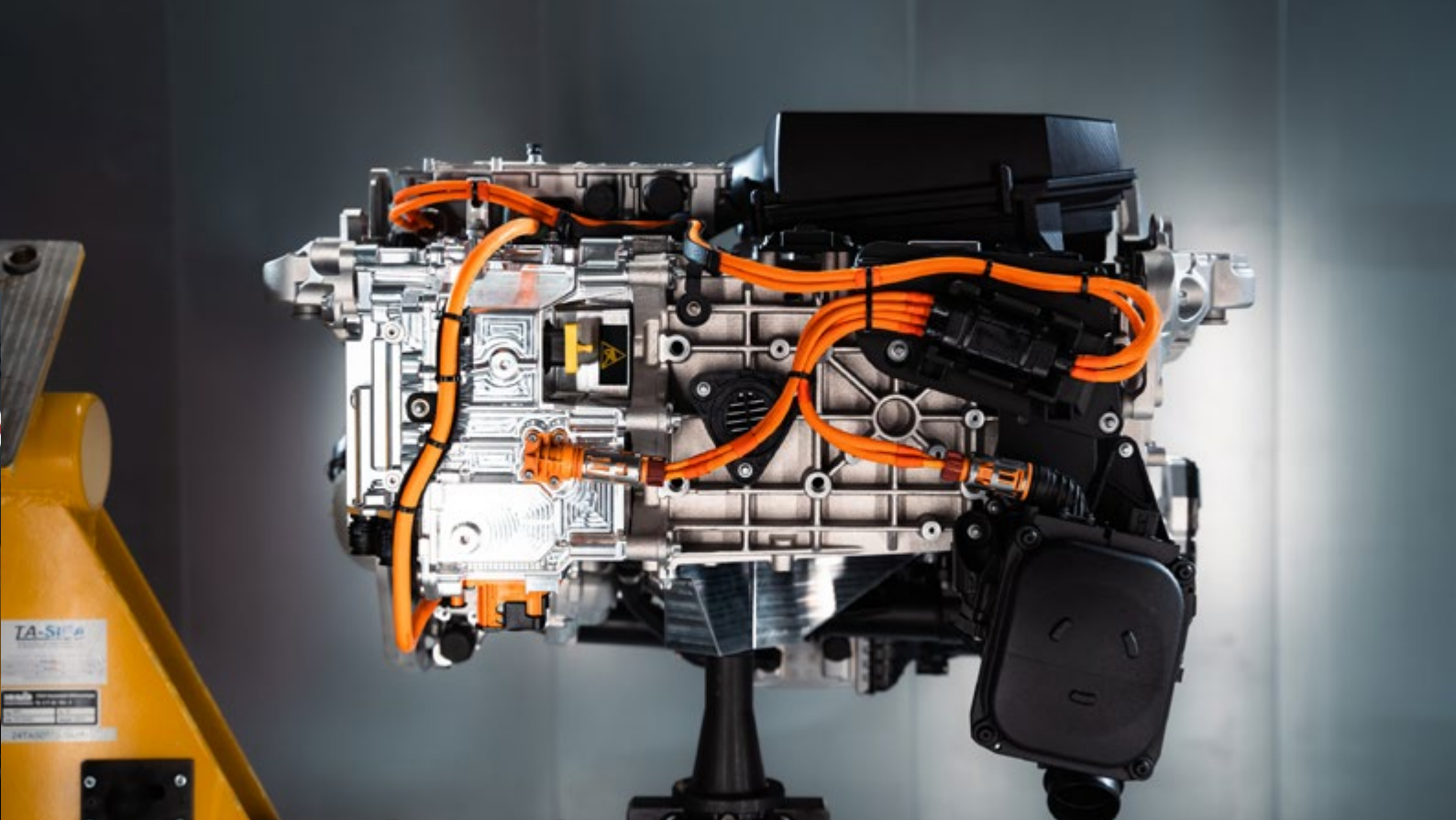
The third-generation BMW fuel cell system: more compact, more powerful, more efficient
The first generation of the fuel cell drive system was supplied entirely by the Toyota Motor Corporation (Toyota) and was fitted in the BMW 535iA back in 2014. The second generation made its debut in the current BMW iX5 Hydrogen pilot fleet. This time, BMW developed the overall fuel cell system itself, while the individual fuel cells came from Toyota.

For the new generation, the BMW Group and the Toyota Motor Corporation jointly develop the powertrain system for passenger vehicles, with the core fuel cell technology creating synergies for both commercial and passenger vehicle applications. This close collaboration enables both companies to leverage synergies in development and procurement while creating brand-specific models.

The third generation of fuel cell technology brings some major improvements:
• Compact design: The space taken up by the fuel cell system has been reduced by around 25%. A considerable increase in power density has enabled a much more compact construction compared to the preceding generation.

• High degree of integration: The third generation can be seamlessly integrated into future vehicle architectures. This paves the way for a technology-open approach that will make it possible to offer customers a variety of drive system variants in future.

• Optimised components and increased efficiency: The system is set to be substantially more efficient than its predecessor. This is being achieved by upgrading individual component parts that are based on the drive technology jointly developed with Toyota and by improved operating strategies. These advances result in increased range and output combined with lower energy consumption, which represents a significant improvement over the second generation.

Technological expertise at the BMW Group in Munich
The BMW Group is making prototypes of the highly efficient fuel cell systems at the company's competence centre for hydrogen in Munich. An electrochemical reaction takes place in the fuel cell, which involves hydrogen from the tanks reacting with oxygen from the air. This reaction produces electricity that powers the electric motor and thereby supplies the vehicle with energy.

The fuel cell system comprises not only the fuel cells themselves, but also all the components and systems needed for their efficient operation. These include the cooling system and hydrogen- and air subsystems. The compact layout ensures the entire drivetrain delivers the levels of performance and safety for which BMW is renowned.

Prototype production is currently focused on development and validation of the assembly and testing processes, with particular attention paid to industrialisation, quality assurance and scalability in the longer term. In parallel to this, the prototypes are being used to develop operating strategy and for validation on both a system and vehicle level. These steps are crucial in preparing fuel cell technology for series production.

Series production at BMW Group Plant Steyr
Production of the fuel cell systems is due to get underway in 2028 at BMW Group Plant Steyr, which can call on decades of development and production expertise covering all drive system types across the BMW Group model range. New test rigs and production facilities are now being built and buildings modified to incorporate the new drive technology and constantly refine it.

"*We are proud to be producing another innovative drive technology at Plant Steyr in future alongside the latest generation of electric motors and combustion engines,*" says Klaus von Moltke, Senior Vice President Engine Production at BMW AG and Director of BMW Group Plant Steyr. "*This, together with the development expertise we have available on-site, makes our plant a prime example of the BMW Group's technology-open approach.*"

Component manufacture at BMW Group Plant Landshut
BMW Group Plant Landshut is responsible for manufacturing key components for the fuel cell vehicles. Construction of new hardware and equipment for series production of the hydrogen-specific BMW Energy Master will start there in late May 2026. The BMW Energy Master controls the supply of power in the vehicle across a range from 400 – 800V. It also acts as the interface for data from the high-voltage battery. This control unit is supplemented by various components that are specifically required for the fuel cell application. Production of the first prototypes of the hydrogen-specific Energy Master will begin in mid-2026 just a few miles away at BMW Group Plant Dingolfing, where the prototypes of the BMW Energy Master for the Neue Klasse models were also made.

www.bmw.com

MORE INFORMATION

MORE INFORMATION

SEGULA TECHNOLOGIES DEVELOPS HIGH-EFFICIENCY ENERGY STORAGE SOLUTION

REMORA, the high-efficiency storage solution patented by SEGULA Technologies, is based on the principle of isothermal air compression and provides a sustainable supply of electricity.

Although renewable energies have been growing steadily for several years, their availability remains dependent on random and unpredictable weather conditions. Efficiently storing renewable energy has therefore become a crucial issue. To meet this challenge, SEGULA Technologies has developed a high-efficiency, flexible, robust and sustainable energy storage solution based on isothermal air compression: REMORA.

Initially designed for marine environments (REMORA offshore), the technology, now patented in some twenty countries, has evolved into REMORA Stack, a mass storage solution for industries and commercial areas, and REMORA Home, a smaller-scale version for private individuals.

REMORA Offshore: technology initially designed for the marine environment

The first version of REMORA, now called REMORA Offshore, was conceived and developed in 2014 to exploit the advantages of the marine environment for energy storage.

Suitable for most coastlines around the world, this initial version consists of a floating platform and submerged tanks. The principle is simple: electricity generated by offshore wind turbines (or another energy source) is used to pump water, which is then used to compress air. This compressed air is then stored in underwater tanks, which maintain a stable temperature and pressure to prevent any loss of energy in the form of heat. When energy is needed, the compressed air is released and converted back into electricity, ensuring a continuous supply even when there is no wind or sun.

This architecture laid the technological foundations that subsequently enabled the miniaturisation of REMORA and its adaptations for other uses.
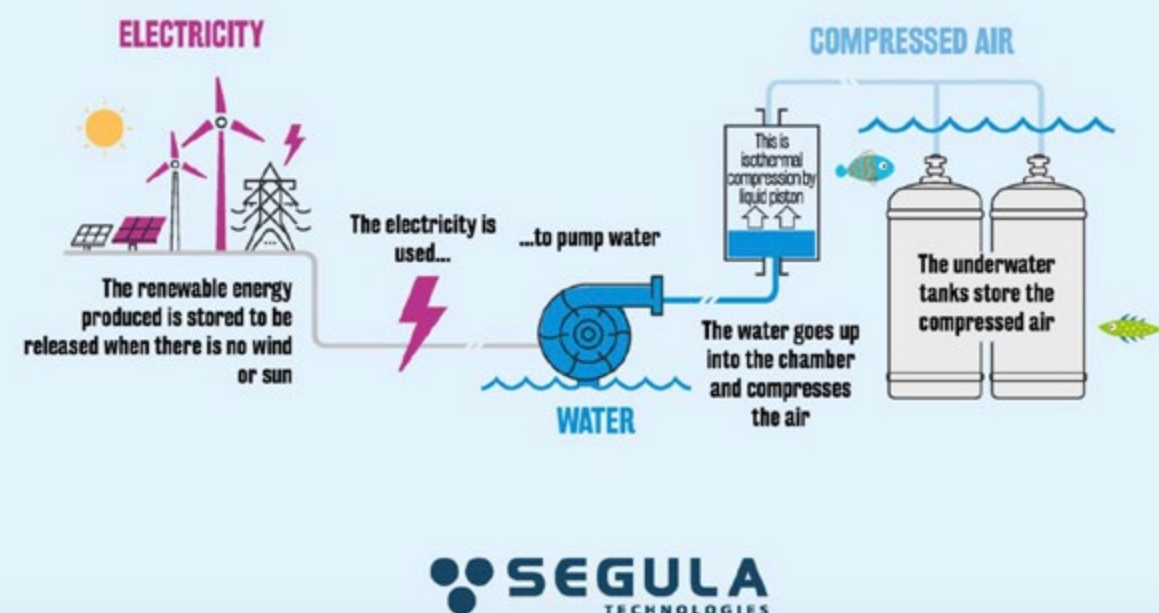
Towards REMORA Stack: energy storage for industrial applications

'For seven years, we focused on offshore energy storage,' explains David Guyomarc'h, REMORA project manager in the Research and Innovation department at SEGULA Technologies. 'But the closer we got to the industrial perspective, the more it seemed appropriate to refocus the project on a more compact version of the system. And as we miniaturised and optimised the system, we needed less and less water.'

And so, in 2021, the REMORA Stack project was born, based on the same isothermal air compression technology as REMORA Offshore, but on the surface and in a format more suited to the specific needs of sites requiring energy autonomy (industrial sites, public infrastructure, shopping centres, eco-neighbourhoods, electric parks, etc.). The objective remains the same: to maximise large-scale self-consumption of green energy.

Here, underwater tanks are replaced by standard containers measuring 12 metres long. They store excess energy in the form of compressed air, which can be released later to generate electricity.

One of the major advantages of REMORA Stack is its modularity: adding containers allows manufacturers to increase storage time without having to replace the compressor, which promises significant savings.

REMORA Stack is currently being developed as part of the Air4NRG collaborative project, funded by the European Union. The first full-scale prototypes will be produced and installed in Spain to fine-tune the technology and validate its performance, before preparing the first series in 2027 and large-scale industrialisation by 2029.

REMORA Home: energy storage for private individuals

But the potential applications of REMORA technology don't stop there! While photovoltaic solar panels are becoming increasingly popular with private individuals, SEGULA is also working on a smaller-scale domestic storage solution: REMORA Home.

Compact, about the size of a refrigerator or water heater, REMORA Home will enable individuals to store excess energy produced by their solar panels or other renewable sources for later use, and to manage their consumption using a dedicated app.

For this system, compressed air is stored in much more compact cylinders similar to diving cylinders, measuring 1.80 metres long and 20 cm in diameter. With these dimensions, 10 cylinders will store approximately 12 hours
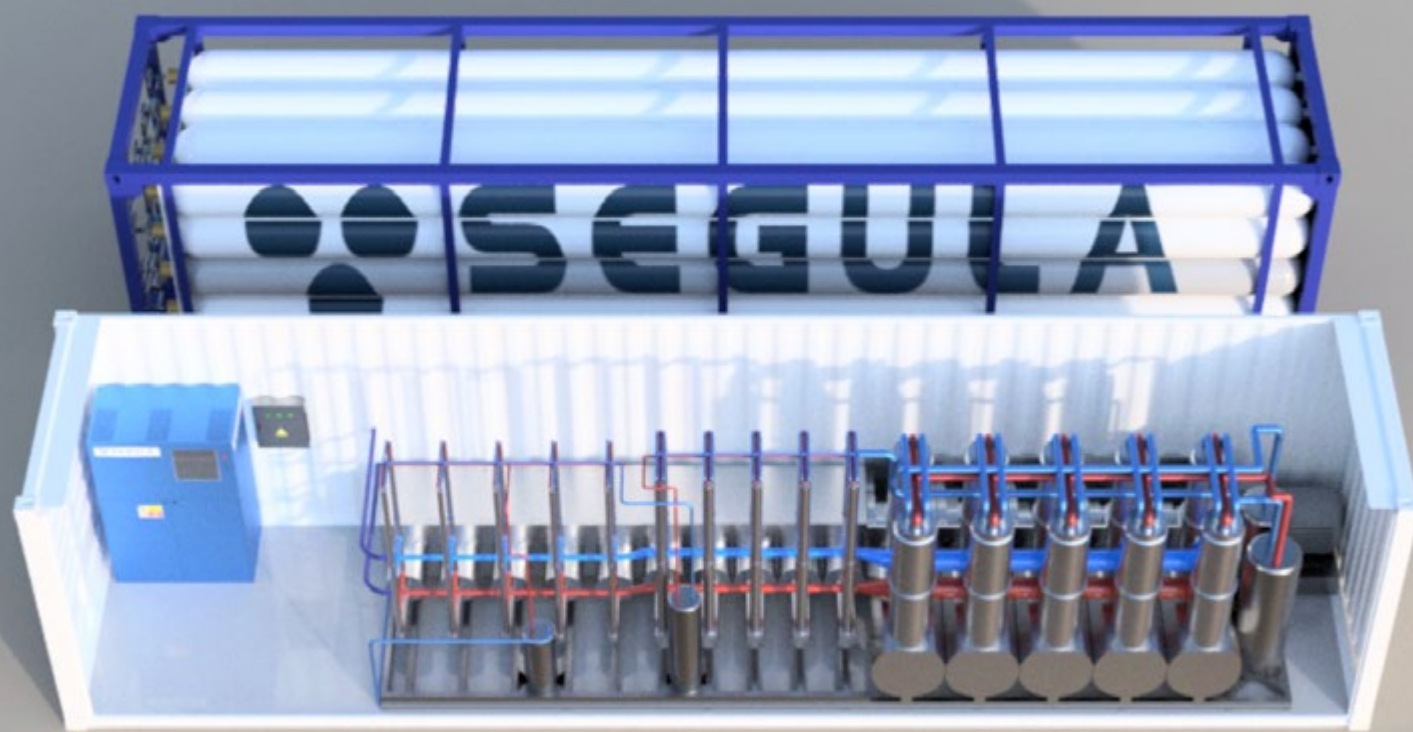
of energy. And if the user wants more autonomy, they can simply add more cylinders according to their needs.

Practical, sustainable and environmentally friendly, this solution could one day compete with lithium-ion batteries

In addition to offering high efficiency and great flexibility to users, its minimum lifespan is estimated at 30 years (compared to an average of 10 years for other batteries). As with other versions of REMORA, its overall efficiency is 70%, which means that 70% of the energy used to compress the air is recovered in the form of electricity during the discharge phase. This rate is comparable to that of the best batteries, while avoiding the use of rare and polluting materials.

Tests on a pilot house will take place in 2026 with the aim of verifying the technology's effectiveness in real-world conditions and preparing for its industrialisation.

And what about the cost?

'It's still a little early to determine the exact cost to individuals,' says David Guyomarc'h. Our goal is to offer a solution that is cheaper than batteries for equivalent installations, while providing longer storage capacity and a longer service life. Today, installing storage at home is not so much about optimising your bill economically, but rather about making it less sensitive to technical uncertainties in the grid or political and economic fluctuations in the market."

The REMORA system has been designed to adapt to all types of tanks, as all the technology is contained within the compressor. Thanks to this modularity, REMORA can store compressed air in small cylinders suitable for homes as well as in large containers intended for energy infrastructures or local authorities.

One of the major advantages of REMORA technology is its flexibility and non-polluting nature. Unlike other energy systems, it does not use any sources of pollution or chemicals. Air and water are used to operate the system and are released without any alteration.

www.segulatechnologies.com

COMAU JOINS THE SPRINT PROJECT TO HELP DEVELOP SODIUM-ION BATTERIES FOR STATIONARY USE

Paving the Way for Safe, Cost-Effective and Sustainable Energy Storage.

Comau has joined the SPRINT project to design and develop a scalable manufacturing solution for quasi-solid-state sodium-ion batteries. Part of the Horizon Europe program, SPRINT aims to revolutionize stationary energy storage by developing cost-effective and sustainable sodium-ion batteries. The consortium will also work together to build a safe next-generation battery cell for multiple stationary applications: the first for residential storage and the second for large-scale grid-connected energy storage. This represents an important step toward accelerating Europe's energy transition and will pave the way for increased safety and sustainability while reducing costs for locally sourced energy storage.

Under the scope of the 46-month project, Comau is tasked with conducting a comprehensive process flow and feasibility study to upscale production of the above-mentioned technology. To do so, the team will examine process optimization considerations, equipment needs and the environmental conditions required for mass production. After which, Comau will design a technology plan to integrate the SPRINT-developed cell technology into existing battery technology lines. The latter will include a clear definition of new or customized equipment developments needed to commercially manufacture the battery cells.

The selected technology, based on innovative NaFePO4, hard-carbon materials, and quasi-solid polymer electrolytes will be validated to fulfill the objective of bringing safe, non-toxic, high-performance battery cells to market that can be mass produced and tailored to end-user needs. In doing so, the consortium aims to achieve significant cost reductions per kilowatt-hour, increased energy densities, an extended battery life cycle and enhanced safety through the innovative, leak-free and non-flammable design. The sodium-ion batteries will use readily available materials from EU supply chains with an eye to further strengthening electrification autonomy within the region.

"Comau's commitment to energy transformation, coupled with our engineering and process optimization expertise, aligns perfectly with the program's objective to advance high-performance sodium-based stationary storage solutions," said Daniela Fontana, Comau's Battery Innovation Manager. "We have know-how and technologies to contribute to achieve the projects' goals of reducing costs, improving energy density and power metrics, extending battery life and safety, and paving the way for mass deployment of this valuable new technology."

Comau's role in helping facilitate green energy transformation is further reinforced at a European level through major partnerships for the development and expansion of the European battery industry, including the company's participation in European Battery Alliance (EBA), Batteries European Partnership Association (BEPA), within which Gian Carlo Tronzano is an Executive Board Member, Upcell - European Battery Manufacturing Alliance, and the Ensemble consortium. Comau's Gian Carlo Tronzano also participates in the European Technology & Innovation Platform (ETIP) for batteries.

This project has received funding from the EU's Horizon Europe Research & Innovation programme under Grant Agreement No.101191903.

You can follow the progress of the SPRINT project on the website www.sprint-he.eu and on LinkedIn at @SPRINT - Horizon Europe.

www.comau.com

MORE INFORMATION

MORE INFORMATION

PROGRESSIVE CAVITY PUMPS: DRIVING EFFICIENCY AND RELIABILITY IN GLOBAL MINING

SEEPEX SCT pumps gently handle flocculants, extend stator life by 200%, and ensure easy maintenance.

SEEPEX BN pumps adapt to pressure and solids variations, handling both low- and high-solid slurries reliably and easily.

Mines will face water issues at some point during their operation, and it is a frequent problem.

SEEPEX.
ALL THINGS FLOW

SEEPEX solutions handle abrasive slurries, flocculants, and dewatering with ease — cutting energy use, reducing downtime, and supporting sustainable operations worldwide.

The mining and metals industry plays a critical role in supporting global progress. From consumer electronics and agriculture to infrastructure and transportation, modern society depends on a secure and sustainable supply of minerals. This dependence is growing as the world accelerates toward an energy transition, requiring large volumes of critical raw materials such as copper, lithium, and rare earth elements.

Mining companies worldwide are under increasing pressure to balance rising demand with sustainability goals. Operators are adopting low-carbon technologies, seeking financing linked to environmental performance, and strengthening collaboration with downstream partners to meet customer expectations for responsibly produced materials. At the same time, they face persistent challenges such as volatile commodity prices, water scarcity, labor shortages, and stricter regulations on safety and environmental performance. Pumps are one of the many technologies that can help address these challenges by improving efficiency, reducing energy consumption, and enabling safer, more reliable operations.

Expectations in the Mining Industry
The key expectations for mining equipment are cost, performance, and HSE (Health, Safety and Environment). Performance remains the top priority, ensuring reliable outputs and consistent product quality. Yet efficiency must not come at the expense of safety or reliability. Pumps that require less frequent maintenance and can be safely dismantled without complex handling reduce downtime and risks to personnel.

Mining is among the harshest industrial environments, where abrasive, corrosive, and variable conditions demand equipment that is robust and adaptable. Selecting the right pump materials is critical to withstand extreme pH levels, salinity, or high solids content. Equipment that meets these criteria not only extends operating life but also supports the industry's commitment to responsible resource use.

An Omnipresent Factor: Mine Dewatering
Water management is a universal challenge in mining. Water may be added intentionally during ore washing or processing, or it may enter naturally as groundwater. Mine dewatering ensures continuous operations by keeping pit floors and underground workings dry, reducing the risk of flooding or slope instability, and enabling safe working conditions.

Efficient dewatering systems are also crucial for meeting regulatory requirements and minimizing environmental impacts. Pumps capable of handling variable flow rates and solids content are essential to ensure stable, cost-effective water management.

Main Applications for Progressive Cavity Pumps in Mining
SEEPEX progressive cavity (PC) pumps are proven in diverse mining environments around the world. Their ability to handle abrasive, viscous, and shear-sensitive media makes them suitable for a wide range of applications:

• **Flocculants**: The low-shear pumping principle preserves flocculants during thickening processes.
• **Thickener underflow**: reliable and cost-effective transfer of concentrates and abrasive tailings.
• **Reagent dosing**: Precise metering of flotation reagents such as PAX, GUAR, and MIBC.
• **Mine dewatering**: High-pressure capability supports continuous underground and surface operations.
• **Filter press feeding**: Smooth, low-pulsation delivery improves efficiency in solid-liquid separation.
• **Explosives emulsions**: Safe, controlled transfer of viscous explosives for rock blasting.
• **Camp wastewater**: Supporting environmental management in remote mining communities.

Energy Savings with SEEPEX
Mining is energy-intensive, and pumps are often overlooked as a source of potential savings. SEEPEX PC pumps are specifically designed for efficient transfer of abrasive, corrosive, or shear-sensitive materials with minimal wear. Operating at low speeds and with a clear flow passage, they ensure smooth, low-shear handling while reducing energy demand.

MORE INFORMATION

MORE INFORMATION

Massive open pit mines are masterpieces of environmental engineering.

SEEPEX mining pumps help reduce operating costs not only at mining sites but also in mineral processing plants.

Key advantages include:

• **Lower installed power** compared to alternative pump types.

• **No gland seal water required**, eliminating additional costs and infrastructure.

• **Constant flow** regardless of backpressure or solids content, ensuring stable operation.

• **Flexible operation**, as PC pumps perform effectively at any point on the curve with no BEP limitations.

• **Reduced life cycle costs**, as both energy and water consumption are significantly lower.

With their easy maintenance features, SEEPEX pumps minimize downtime, enable safer handling, and extend service life. They can be installed on simple baseplates or engineered skids that integrate control systems and safety features for complete solutions.

Why Choose SEEPEX?
SEEPEX delivers solutions that meet the demanding requirements of global mining operations. Their pumps combine robust performance with efficiency, ensuring reliable handling of mineral slurries, corrosive media, and sensitive reagents. With a wide range of materials available, SEEPEX ensures compatibility with harsh mining conditions while preserving the integrity of sensitive media such as flocculants.

Backed by global engineering expertise, EPCM support, and a worldwide service network, SEEPEX partners with mining operators to improve productivity, lower costs, and support a sustainable future.

www.seepex.com

PC pumps can aid in wastewater management for remote mining camps that house the mining crews, too.

DELIVERING RELIABLE ELECTRIC POWER FOR A WHOLE WORKING DAY

Komatsu expands electric product range with new PC20E-6 mini excavator.

Komatsu is pleased to announce the commercial availability of their latest addition to their electric product range, PC20E-6. Designed to meet the demands of a full working day, the Komatsu PC20E-6 is ideal for both traditional jobsites and noise-sensitive or indoor applications where zero emissions are required.

The aim of the design is to provide a machine that fulfils the requirements of a realistic working day on the construction site while being as cost-efficient as possible.

Absolute peace of mind with Komatsu E-support
The 11.8 kW battery-powered mini excavator with 23.2 kWh battery capacity and an operating weight of 2110 kg has a drive train specially developed by Komatsu in Europe. This not only means a major advantage through comprehensive quality control options, but also offers a special guarantee on the Komatsu electric components. This machine also comes with Komatsu "*E-Support*" customer program. Specially developed for owners of Komatsu electric mini excavators, this program consists of three parts:

• Factory scheduled, free maintenance by a Komatsu-trained technician using genuine Komatsu parts;
• 3 years or 2,000 hours warranty for the machine;
• 5-year or 10,000-hour parts warranty for the high-quality components of the electric driveline.

"*The Komatsu E-Support customer program is included free of charge with every market-ready electric mini excavator and offers exclusive machine support,*" adds Emanuele Viel, Group Manager Utility at Komatsu Europe.

The bottom line is that the risk for the end customer is significantly reduced, especially when it comes to exploring the electrification advances in the industry.

Data-driven development for reliable performance
Numerous data-driven findings from Komatsu have been incorporated into the development of the machine.

The Komatsu fleet management system Komtrax was used to analyse 40,000 working days of mini-excavators of a comparable size. The result: 90% of mini excavators work less than 3.5 hours per day. This defined the target for the required, reliable working time with the excavator. This result makes it possible for Komatsu to offer an attractively priced machine with a performance that exactly matches the requirements.

Depending on the operating mode, the PC20E-6 offers capacity for around 3:20 hours (operating mode P), 3:40 hours (operating mode E0) or 4:00 hours (operating mode E1).

Thanks to various charging solutions suitable for different contexts, the machine can also be recharged flexibly, for example by fast charging during the lunch break. The PC20E-6 already operates in the high-voltage range with a system voltage of 77V. An on-board charging option for 230V and 3kW charging power compatible with various plug adapters is offered as standard, as well as the option of an external DC quick charger for 400V and 12kW charging power (from October 2025).

Komatsu's extensive data analysis, including findings from its electric forklift trucks in Japan, suggests a battery service life of around 10 years, assuming it is charged and discharged daily during operation.

Efficient and sustainable operation
The machine is also attractive because of its simplified daily maintenance. Compared to the conventional PC20 with combustion engine, some aspects of daily maintenance prior to commissioning are no longer necessary. There is no need to check:

• the dust indicator
• the water separator, drain water and sediment
• drain water and sediment from fuel tank
• coolant level, add coolant
• oil level in engine oil pan, add oil

The concept of this innovative machine also includes operation with ID keys as standard. Each machine is supplied with a registration key and three operator keys. One machine can register up to 255 operator keys, while an operator key can be stored for an unlimited number of machines across all models. This is another way to save resources and make every day work more efficient!

Moreover, the PC20E-6 contributes to a company's ecological footprint with a recycling rate of 99% of its total mass. This makes it an ideal solution for tenders that require no local emissions or are aimed at operations inside buildings or in noise-sensitive areas.

www.komatsu.eu

WORLD'S FIRST ALL-ELECTRIC DECONSTRUCTION SITE

VOLVO

Volvo CE and Volvo Trucks power the world's first zero-emission deconstruction project at Siemens Technology Campus, Germany, demonstrating sustainable urban transformation with electric machines and mobile charging.

In a bold demonstration of sustainable power, Volvo CE deployed five electric machines - including compact, mid-size and grid-connected models - to deliver high-performance demolition for Siemens' €500 million Technology Campus development. The machines handled everything from selective gutting to concrete crushing and materials transport, supported throughout by electric trucks from Volvo Trucks.

The project marks the first full-scale electric deconstruction of its kind, proving that emission-free deconstruction is achievable today with the right technology, partners, and ambition.

The electric fleet included:

• Volvo ECR18 Electric compact excavator with hydraulic breaker, operating inside the buildings performing precise break-up and demolition of concrete and masonry

• Volvo L20 Electric wheel loader transporting the extracted materials from inside the buildings for processing

• Volvo EW240 MH Electric grid-connected material handler for exterior deconstruction and handling

• Volvo EC230 Electric crawler excavator for deconstruction, concrete cutting and crusher feeding

• Volvo L120 Electric wheel loader for transporting materials to and from the electric crusher

Together with demolition specialists, Metzner Recycling, the machines deconstructed three buildings across nearly 25,000 cubic meters. Indoors, the compact excavator and wheel loader operated safely and quietly – supported by a Husqvarna DXR145/DXR305 demolition robot – eliminating emissions and the need for air filtration systems and speeding up demolition tasks. Externally, powerful electric machines dismantled, crushed and loaded materials directly into a Kleemann electric crusher and screening plant, with a Volvo FM Electric hook lift and a Volvo FH Electric semi tractor from Volvo Trucks transporting materials off-site.

The fleet sorted and processed approximately 12,800 tons of construction waste. An impressive 96% was recycled into raw materials for future use – supporting the shift towards circular materials management and cutting down transport-related costs and emissions.

Power for the job site was provided by a custom on-site transformer, which provided a direct connection to the grid and access to certified renewable electricity. This allowed multiple machines to be fast charged simultaneously, while ensuring a continuous energy supply for the grid-connected equipment. grid-connected material handler for exterior deconstruction and handling.

Operating on an active campus – with nearby offices still in use – the low-noise performance of the electric machines proved a major advantage, minimizing disruption while maintaining productivity.

Pioneering zero-emission deconstruction with Volvo CE's electric machines

The new state-of-the-art, 200,000 square-meter Siemens Technology Campus is designed to be zero-emission, adhering to the highest sustainability standards. However, an emission-free deconstruction was not part of the original scope. Instead, it came about through close collaboration between Volvo CE and Metzner and was enthusiastically received by Siemens.

Any initial operator concerns faded quickly once they experienced the electric machines for themselves. Feedback highlighted their impressive power, responsive handling and quiet, emission-free performance. The plug in charging process – which replaces conventional on-site refueling – also proved convenient and efficient.

"*The fact that we have now taken the first major step towards an all-electric, low emission dismantling site as a technical standard is a huge success for us – the Metzner team – and our clients. I get goosebumps when I think about what these machines make possible. Electric equipment could unlock urban projects currently held back by noise and pollution concerns. In fact, we've already introduced electric wheel loaders at some of our other sites,*" said Michael Metzner, Owner of Metzner Recycling.

https://youtu.be/1bjmjZ4hiPc

www.volvoce.com

PIETRO CARNAGHI JOINS FIVES, FURTHER STRENGTHENING THE GROUP'S LEADERSHIP IN THE MACHINE-TOOL SECTOR

Large Vertical Lathes

UNI100 Gantry milling machine

Vertical Turning Lathes

Fives acquires Pietro Carnaghi S.p.A., expanding its capabilities in large-scale and high-precision machining for defense, nuclear, aerospace, and energy sectors.

With this acquisition, Pietro Carnaghi becomes a cornerstone of Fives' High Precision Machines (HPM) division, strengthening the capabilities of two global, customer-centric, market-leading players and better serving their customers bases with innovative, reliable, and locally supported solutions worldwide.

Expanding Capabilities to Meet Customer Needs Worldwide Together, the operations of Fives' HPM division and Pietro Carnaghi are expected to generate revenue of approximately €400-450 million, relying on the combined workforce strengths of 1,900 global employees to expand markets, enhance capabilities, and deliver even greater value to clients:

• Global presence and enhanced customer value: With Pietro Carnaghi, the HPM division will operate through 24 entities worldwide —11 in North America, 7 in Europe, and 6 in Asia. These ensure proximity, responsiveness, and tailored support for customers around the world, from project design to installation and throughout the equipment's entire lifecycle.

• Expanded machining solutions: Customers from strategic sectors, such as defense, nuclear, aerospace and energy, can now access an expanded range of high-precision machining solutions. This portfolio includes vertical lathes, gantry mills, large machining centers and FMS (Flexible Manufacturing Systems) engineered by Pietro Carnaghi

for machining complex, large-scale, rotary parts, typically used on mission critical processes. Based on this extensive range of technologies embedded in iconic names like Giddings & Lewis, Cincinnati, Liné Machines, Landis, Bryant in North America and now Pietro Carnaghi, Fives reinforces its capacity to deliver advanced manufacturing solutions, enabling customers to tackle complex challenges with increased reliability and performance.
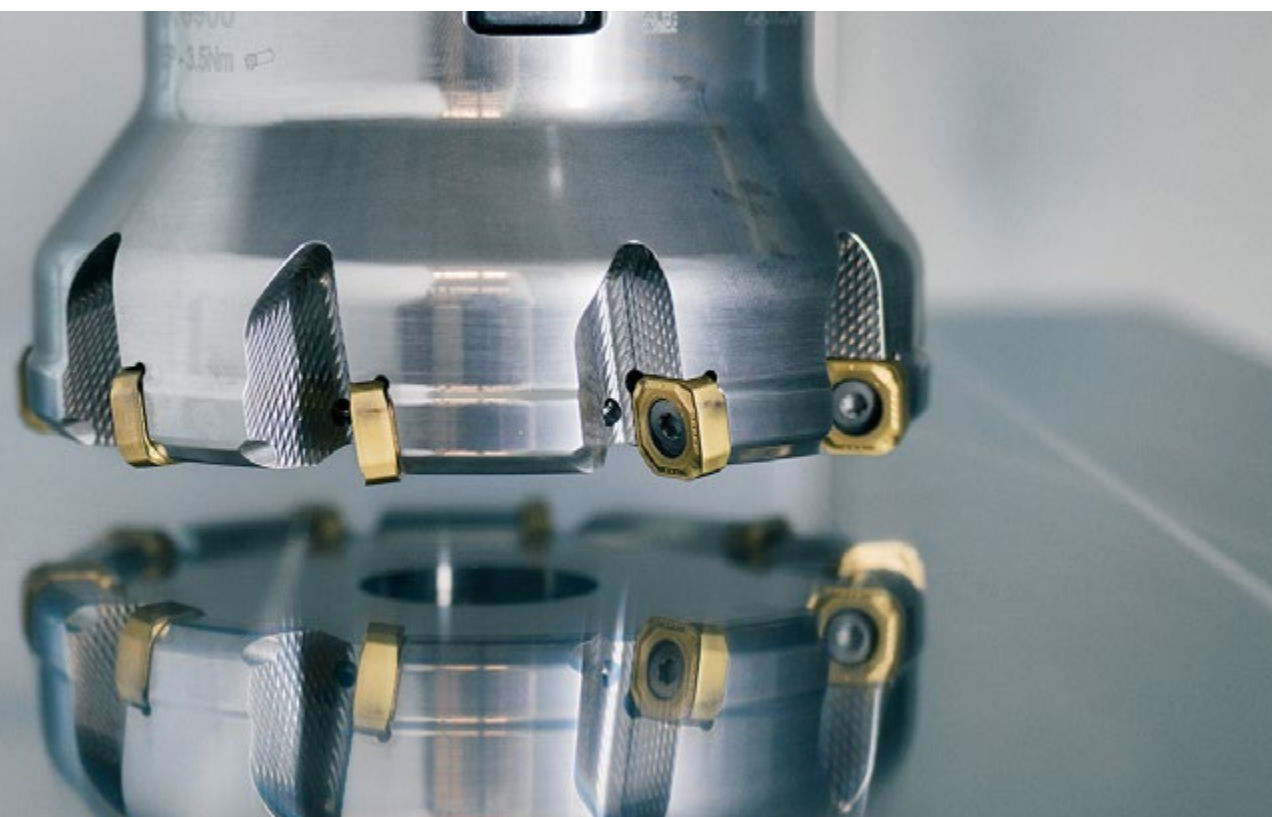
• Reinforced industrial setup: By integrating Pietro Carnaghi, Fives will increase its manufacturing capabilities and gain greater control over its supply chain, thanks to the integration of a state-of-the-art 45,000 sqm industrial facility in Northern Italy, that meets the highest global standards.

"*This transaction reinforces Pietro Carnaghi's ability to maintain ongoing activities and honor existing contractual commitments, ensuring consistent and high-quality presence in the market.*" Giuliano Radice, Chairman at Pietro Carnaghi.

"*We are delighted to welcome Pietro Carnaghi; this acquisition perfectly illustrates our belief that by bringing together the most advanced expertise from around the world, we can meet the major challenges of energy transition and industrial performance, especially in the strategic sectors of aerospace, defense, energy and space*", Frédéric Sanchez, President & CEO of Fives Group.

www.fivesgroup.com

THE .38 FINISHING FACE MILL

COMPACT POWERHOUSES WITH VERSATILE CONFIGURABILITY

New DC-Motors from the GXR and SXR Families in the FAULHABER Portfolio © FAULHABER

Seco launches the .38 Finishing Face Mill system, offering high-precision cutters with simplicity, flexibility, and adjustability to deliver efficient, flawless surface finishing across diverse applications.

New DC-Motors from the GXR and SXR Families in the FAULHABER Portfolio.

Precision, simplified
The .38 Finishing Face Mill / SNFX1204 system offers three cutter variants—fixed pocket, hybrid, and adjustable—each tailored to different levels of control and performance. Whether your priority is achieving consistent surface finishes or minimizing setup effort, this system offers a practical and flexible solution. Offering two insert types to meet different demands—one with an 88° lead angle for near-wall machining and another with a 27° lead angle for high-feed, open-surface work—you can cover a wide range of finishing challenges while keeping operations simple and cost-effective.

• The Fixed Pocket Cutter (R220.38-….-SN-..SA) is ideal for users seeking effortless handling and setup-free operations. Its tilted screw design ensures perfect insert self-centering and excellent run-out accuracy (4–15 µm), making it a cost-efficient solution that reduces operator error and training needs.

• The Hybrid Cutter (R220.38-….-SN-..CSA) combines fixed and adjustable cassette- pockets, allowing it to function as a fixed pocket tool by default. The cassette inserts act like dedicated wiper inserts for enhanced surface finish and, while adjustment is possible, it's not required—offering flexibility without added complexity.

• The Adjustable Cutter (R220.38-….-SN-..HSA) offers ultimate control, with fine-tuning capabilities that achieve run-out as low as 0–2 µm—perfect for demanding applications where surface perfection is non-negotiable.
"*With the .38 Finishing Face Mill system, we've focused on making high-performance finishing both easy and dependable,*" says Tobias Jakobi, Product Manager Face Milling at Seco. "*Ease of handling is essential in finishing operations, and this solution gives users the flexibility to meet varying demands—often with just one system where two might have been needed before.*"

The .38 Finishing Face Mill system will be available globally starting in September 2025.

http://www.secotools.com/

With the expansion of its product portfolio, FAULHABER is introducing several new additions to its range of DC-micromotors: the high-performance motors of the new GXR series 1437 with copper-graphite commutation, as well as precious-metal-commutated motors of the proven SXR series in sizes 1424 and 1437. Designed for maximum reliability and flexibility, these drives open up new possibilities for modern, space-saving drive solutions.

With a diameter of 14 mm, the new models are perfectly matched to the modular FAULHABER product range – including seamless compatibility with planetary gearheads and magnetic encoders. Product Manager Dario Del Favero explains: "*With the new 14-mm motors, users no longer have to compromise on compactness, functionality, or performance. In combination with the precisely matched 14GPT gearhead and the IEP3 encoder, a diameter-compliant complete solution is created, delivering optimum efficiency and maximum dynamics.*" Thanks to the precise coordination of components, developers and engineers benefit from perfectly harmonized synergies from a single source.

Robust, Durable, and Individually Configurable
The GXR and SXR motors feature a durable, robust design and excellent performance. One contributing factor is the hexagonally wound coil, which enables maximum power density in the smallest space. In addition to various bearing configurations, flexible voltage variants and a wide range of electrical connection options are available. Modifications to the front and rear shaft as well as optimized rotor balancing are also part of the offering.

Like all FAULHABER products, the new DC-motors are RoHS-compliant and meet the highest quality standards. The wide variety of configuration options allows for precise adaptation to diverse application areas – for example, in high-end optical systems, telescopes and microscopes, as well as in medical applications such as surgical robots or infusion pumps.

Perfect Fit for the Modular FAULHABER System
With the new GXR and SXR motors, FAULHABER reaffirms its commitment to delivering powerful drive solutions for high-tech applications. Thanks to their modular combinability and high adaptability, these compact DC-motors open up new perspectives in miniaturization and system integration – while ensuring maximum performance and reliability.

https://www.faulhaber.com/

MORE INFORMATION

MORE INFORMATION

ARO® LAUNCHES ELECTRIC DIAPHRAGM PUMP TO ENHANCE EFFICIENCY AND RELIABILITY

LEMO LAUNCHES RUGGED, MINIATURE OPTIMA D SERIES CONNECTORS FOR MISSION-CRITICAL SYSTEMS

E2P10 with motor

ARO, a leader in fluid handling solutions, proudly announces the introduction of its latest innovation: the ARO electric double diaphragm pump EVO 210. Designed to deliver a dependable and economical solution for general transfer and batching tasks, this new pump expands ARO's renowned double diaphragm range with a powerful electric option.

LEMO introduces the OPTIMA D Series, a compact and rugged connector platform engineered for performance in the most demanding environments. Purpose-built for defense, aerospace, and mission-critical systems, the new series combines miniaturized form factors with military-grade reliability.

The ARO EVO 210 is engineered to provide enhanced efficiency and savings, especially in applications where compressed air is not an available resource or higher efficiency is desired. This model strikes a perfect balance between performance and simplicity, ensuring a cost-effective diaphragm pump solution without compromising on reliability.

Its unique and compact design facilitates a smaller overall footprint, with a simple yet robust drive-train, optimizing the number of components as well as reliability and cost. Additionally, its innovative diaphragm orientation allows for quick and easy maintenance, maximizing operational uptime.

Safety and reliability are at the forefront of the ARO EVO 210 design. Key features include:

Overpressure Protection and Leak Detection: Visual leak protection is standard on all models, complemented by secondary containment preventing pumped media from contacting and damaging the actuator and drive mechanisms in the event of diaphragm leakage. Optional electronic leak detection and over pressure protection are available as well.

Ease of Maintenance: Diaphragms positioned on the same plane offer ergonomic access, reducing maintenance time and enhancing safety. The pump is CE marked and adheres to ISO 12100 standards, with motor options featuring regional certifications.

Additionally, the ARO Protect program is available for this model, further optimizing the total cost of ownership through extended warranties and regular preventative maintenance parts kits. This initiative aims to reduce maintenance time and increase uptime for users.

"The launch of the ARO electric diaphragm pump EVO 210 not only expands our product line but also underscores our commitment to providing advanced, reliable solutions in fluid transfer and batching," said Mike Henning, Global Product Manager at ARO. "We believe this innovative pump will greatly benefit our customers by maximizing efficiency, reducing maintenance, and providing peace of mind."

For more information about the new ARO electric diaphragm pump EVO 210 and its features, please visit our site.

www.arozone.com

Rugged, compact, and configurable
Engineered to meet the evolving needs of tactical communications, UAVs, avionics, and soldier-worn equipment, the OPTIMA D Series offers:
• IP68 sealing (20m/2h) – even when unmated
• MIL-STD-810H compliance – resistant to shock, vibration, and extreme environmental stress
• Push-Pull and Break-Away latching – for secure, blind mating in high-pressure scenarios
• Modular design with robust 5-way keying – to support rapid deployment and error-free connections
• Multiple configuration options – including high-speed (USB, Ethernet), multipole, and coaxial

Optimized for integration
With a compact, overmolded design that's 25% shorter than standard LEMO connectors, the OPTIMA D Series enables space-constrained integration without compromising signal integrity or ruggedness.

Its uniform PCB height and flush-mounting options streamline system architecture, making it a go-to choice for OEMs developing compact, durable platforms.

End-to-end cable assembly services
To support rapid and secure integration, LEMO offers full cable assembly services:
• Custom overmolding
• Complex harness design
• Private labeling
• Certified production: IPC-620, ISO 9001, AS9100, and MIL-STD-810

Availability
The OPTIMA D Series is now available globally directly from LEMO and its network of authorized distributors and partners. Whether for new designs or system upgrades, this next-generation solution is ready to meet the demands of today's most challenging defense, aerospace, and tactical applications.

Discover the OPTIMA D Series or request a sample from www.lemo.com

MITSUBISHI ELECTRIC ICONICS DIGITAL SOLUTIONS EARNS ISO/IEC 27001 CERTIFICATION

This milestone affirms the company's enterprise-wide commitment to safeguarding customer data, protecting intellectual property, and ensuring the resilience of its software and corporate systems.

Mitsubishi Electric Iconics Digital Solutions—a global leader in industrial automation, smart and sustainable buildings, and digitalization software—has earned ISO/IEC 27001:2022 certification, the internationally recognized standard for information security management.

This milestone affirms the company's enterprise-wide commitment to safeguarding customer data, protecting intellectual property, and ensuring the resilience of its software and corporate systems.

Ted Hill, President & CEO, emphasized the significance of the achievement: "*Achieving ISO/IEC 27001 underscores our dedication to securing digital operations and strengthening the trust our customers place in us. This recognition validates our commitment to delivering high-performance, secure solutions.*"

Meeting the Highest International Security Standards
ISO/IEC 27001 provides a globally recognized framework for establishing, maintaining, and improving an information security management system (ISMS). The certification—issued by BSI, the business improvement and standards company—recognizes that Mitsubishi Electric Iconics Digital Solutions met rigorous criteria across risk management, operational continuity, and data protection.

Kyle Reissner, Vice President, Product Management, added: "*Our teams work tirelessly to ensure our security practices meet and, in many cases, exceed market needs and customer expectations. This achievement validates our internal efforts and reinforces the confidence customers have in GENESIS — our industrial automation and digitalization platform.*"

What This Certification Means for Our Customers
Customers can expect clear, measurable benefits that enhance trust in our security practices and software solutions, such as:
• Independent verification of adherence to security best practices
• Stronger safeguards for data, intellectual property, and digital infrastructure
• Greater assurance when deploying solutions in regulated or mission-critical environments
• Ongoing refinement of risk management and incident response protocols

This recognition strengthens our ability to serve global markets with trusted data protection and secure, high-performance platforms.

www.iconics.com

ALTECH CORP ANNOUNCES AVAILABILITY OF TOUCH-PROOF TERMINAL STRIPS
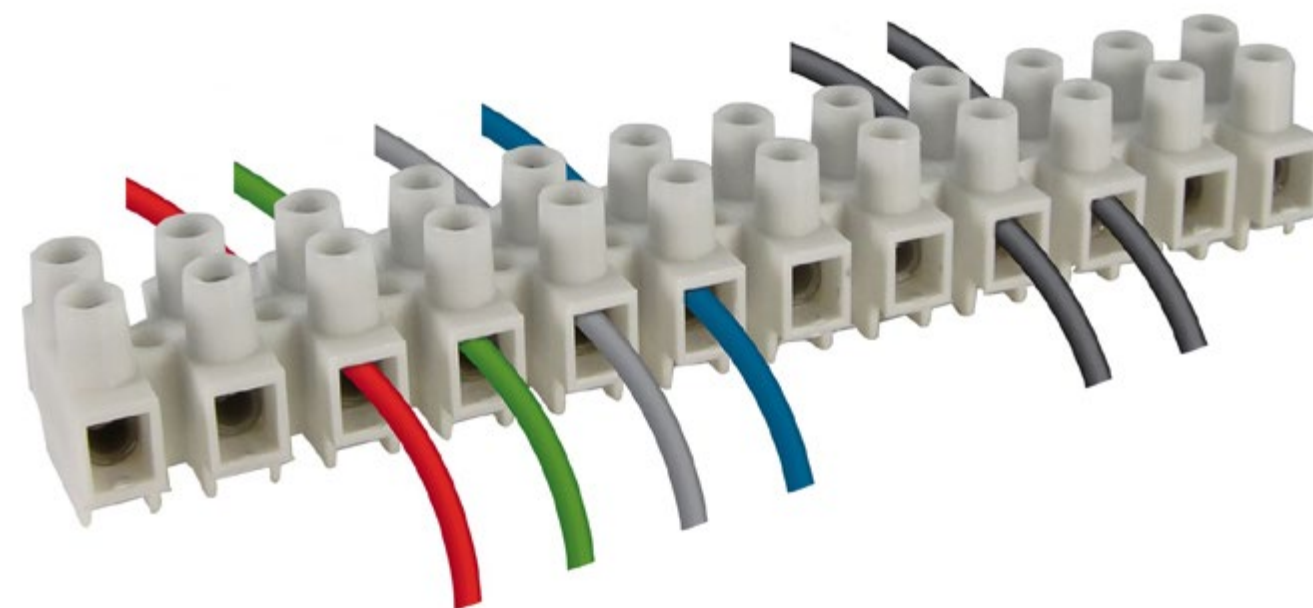
Eurostrips function as a modern replacement for traditional double-row barrier-style terminal blocks, featuring a touch-proof design to eliminate shorts and enhance safety.

Altech Corporation, a leader in industrial automation solutions, announces the immediate availability of its full range of Eurostrips® termin al strips. These economical and touch-proof wiring solutions are now in stock and ready to ship, offering a quick and efficient wire-to-wire connection point for a variety of industrial applications, such as HVAC, appliances, equipment, power distribution and junction boxes.

Eurostrips® function as a modern replacement for traditional double-row barrier-style terminal blocks, featuring a touch-proof design to eliminate shorts and enhance safety. Featuring screw clamp connection technology, the strips are available in 12 poles or can be pre-cut to the required number of poles. Units are easy to cut to length using a hacksaw or utility knife.

Terminal strips also include a self-extinguishing polyamide PA66 housing with high mechanical strength. The current-carrying metal inserts are made of corrosion-free material, such as tinned brass or nickel-plated copper alloy. Accessories, including jumpers, separation plates and marking pins, are available for convenient installation.

Altech Eurostrips® include the following product families:

• HE Series: Designed to be a cost-effective, reliable wire-to-wire solution, these flat base panel mount terminal strips are available in 300V and feature a wire protector.

• HEH Series: These standoff feet panel mount terminal strips are rated for 600V. Like the HE Series, they also include a wire protector.

• HE42 Series: This series includes pluggable flat base panel mount terminal strips — available in both 300V and 600V options — with a plug and socket design.

• ATS Series: These units feature a center barrier and wire protector and are rated for 300V, serving as a modern replacement for double-row barrier style terminal blocks.

• ATSF Series: These standoff feet panel mount terminal strips are rated for 600V and include a center barrier and wire protector.

www.altechcorp.com

mepax

OPTIMIZE YOUR **INTERNATIONAL PR** AND ADVERTISING FOR THE **INDUSTRIAL** MARKET!

PRESS RELATION   ADVERTISING MEDIA PLAN   CONTENT EDITING   LINKEDIN WEBINAR

International capability

More than 80 employees in 35 different countries, ensuring a strong relationship with main local media.
Mepax distinguishes itself through its extensive media knowledge and ability to select the best international online/print advertising options.
PR can be translated into 35 languages.

Outstanding results

50,000 published articles in 2023: EMEA: 48% - Asia: 31% - Americas: 21%. Most of the articles are published in the top 1000 media worldwide.

Optimized process

With a proven process set for more than 200 active customers, we can adapt to all specific client needs with the highest reliability. We have developed in house the most advanced PR dedicated ERP, enabling transparency and real-time full online reporting. International media management is then made easy, fast, and efficient for optimal results.

www.mepax.com

info@mepax.com

THE MOST **INNOVATIVE** PR AGENCY