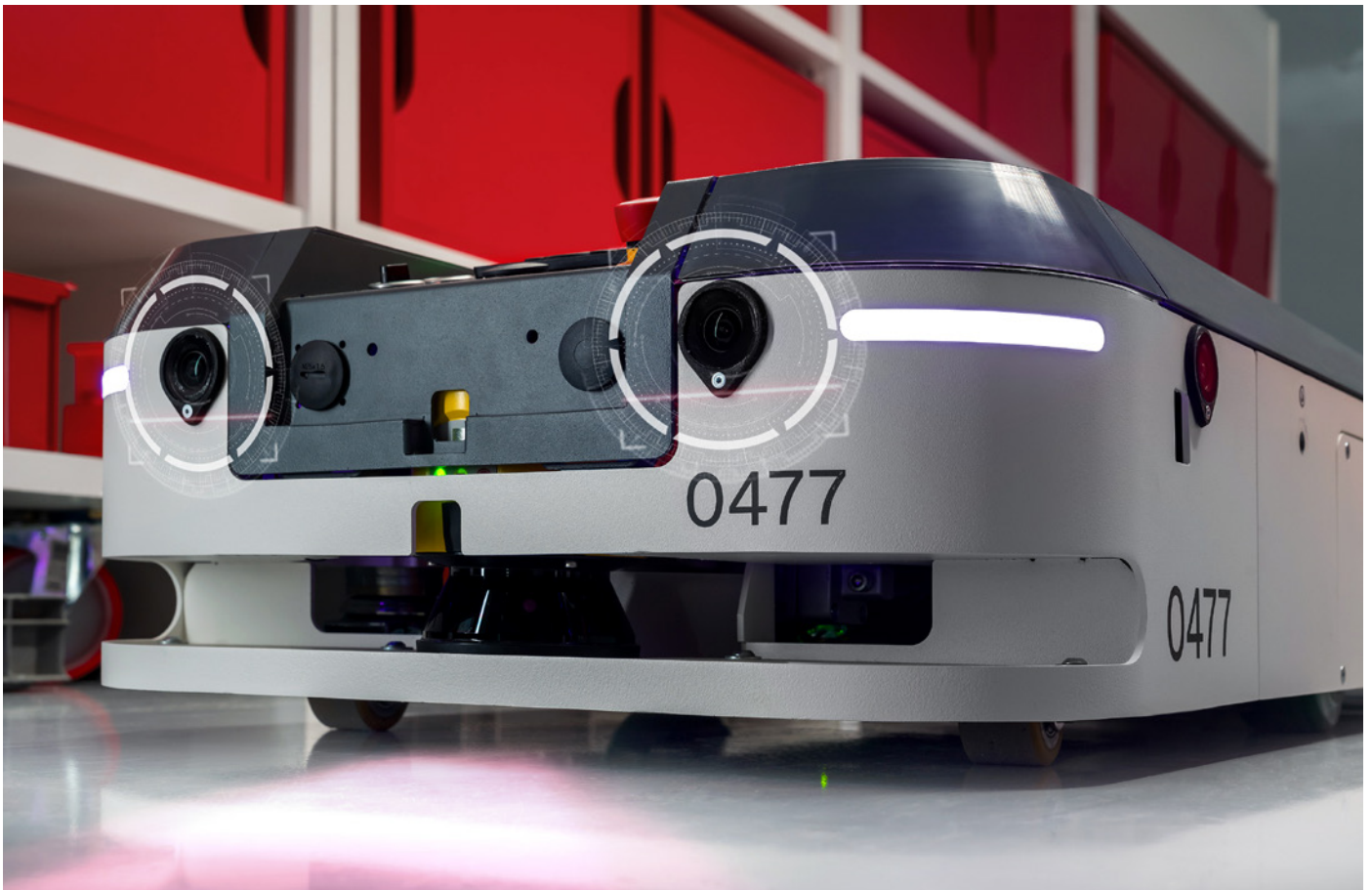


The Flexible Factory

See the shift in production lines and technology during Automate 2024

Matthew Jaster, Senior Editor

Automate 2024 (Chicago) offers comprehensive automation education and new developments in robotics, vision, AI, motion control and other technologies. Automate delivers the latest innovations in manufacturing automation technology from more than 800 exhibitors. If the robotic and automation highlights aren't enough, the show also hints at the evolution of AI, IIoT, e-Mobility, condition monitoring and intuitive software. This article previews the show floor topics reshaping manufacturing for the foreseeable future.



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Expanding Capabilities of AI

Marc Segura, president, ABB Robotics Division said accelerating progress in AI is redefining what is possible with industrial robotics. AI is enhancing everything from robots' ability to grip, pick and place as well as their ability to map and navigate through dynamic environments. From mobile robots to cobots and beyond, AI is giving robots unprecedented levels of speed, accuracy, and payload carrying ability, enabling them to take on more tasks in settings like flexible factories, warehouses, logistics centers and laboratories.

"AI-enabled mobile robots can transform sectors like discrete manufacturing, logistics and laboratories," said Segura. "Robots equipped with ABB's new Visual Simultaneous Localization and Mapping (Visual SLAM) technology, for example, have advanced mapping and navigation skills, granting new levels of autonomy, while greatly reducing the infrastructure needed by previous generations of guided robots. This paves the way for a shift from linear production lines to dynamic networks, creating significant efficiencies and taking on more dull, dirty, and dangerous tasks, to enable workers to take up more rewarding jobs."

IT/OT Integration

The future of manufacturing is intricately linked to IT/OT integration as data will underpin innovation and efficiency, said Anders Billesø Beck, vice president of innovation and strategy at Universal Robots. "Research shows that the manufacturing industry has been at the forefront of adopting cloud-based software services and we are already seeing some customers use these to enhance quality, cost efficiency, and predictability. That makes me confident that 2024 will see the growth of data-driven logistics and manufacturing systems," Beck said.

Many still have an outdated view of the cloud merely being a data collector and backup function, as we know from our private lives. But the real potential and power doesn't lie

in storing data or even in linking machines. The real transformative leap comes when cloud-based software services connect humans and machines and thus help manufacturers simplify complex processes and make smarter decisions.

The benefits of this digital evolution are significant. Remote access to manufacturing data enables quick responses to issues and continuous automation improvement. With dynamic systems now essential, trusted cloud technologies offer the latest in security and state-of-the-art services. IIoT companies highlight this progression, promising improved efficiency, and reduced downtime through Overall Equipment Effectiveness (OEE) visualization and predictive maintenance.

Manufacturers stand to gain from these advancements, achieving higher quality, reduced downtime, better predictability, and cost optimization. This transition is a strategic necessity, supporting the shift towards high-volume, high-mix production, resilient supply chains, competitive data utilization, and sustainability goals.

Evolution of Cobots

The Fanuc CRX-25iA cobot offers an enhanced 30 kg payload and 1,889 mm reach for case palletizing.

Guided by a 3DV/200 iRVision sensor mounted to the arm, the CRX-25iA will palletize boxes to nearly 7' high. In addition, the CRX-25iA can be mounted to a mobile cart to showcase its flexibility. The robot can be easily repositioned by hand and uses vision to automatically adjust to its new location and continue working accurately. Fanuc's entire series of CRX collaborative robots are reliable, flexible and can run for eight years without maintenance.

Specifically designed for palletizing tasks, the robust HC30PL collaborative robot from Yaskawa Motoman—with plug and play capability—facilitates safe, efficient fenceless production in demanding environments. Ideal for medium-volume lines, this cobot offers hand-guided programming for fast deployment on demand, and it features a 1,700 mm maximum reach, a 30 kg payload capacity, an easy-to-clean surface, and NSF H1 certified food-grade grease as standard. Meeting established safety standards, the HC30PL supplies four modes of collaborative operation and can easily shift between collaborative speed in PFL mode or full speed in industrial mode (based on risk assessment and process requirements) to accommodate fluctuating demands.



The Universal Robot UR30 was presented during iRex 2023 in Tokyo, Japan.

Universal Robots UR30 is the second in Universal Robot's new series of innovative, next generation cobots and is built on the same architecture as the UR20.

The UR30 is ideal for several applications, including machine tending, material handling and high torque screw driving. For machine tending, the high payload brings new possibilities as it allows the cobot to use multiple grippers at the same time. This means it can remove finished parts and load more material in one single pass, shortening changeover times and maximizing productivity.

"As industries evolve, the UR30 not only meets but anticipates shifting demands, enabling businesses to adapt and respond to changing needs effectively. As we continue to innovate, the UR30 is another step in UR's journey in pushing the boundaries of what is possible in the world of automation," said Kim Povlsen, president, Universal Robots.

Where is this technology going in the next five to ten years? This will be a question posed to several exhibitors on the trade show floor this May.

Augmented Reality Software

Employing the power of smartphones and Augmented Reality (AR), Kuka has launched its new *Kuka.MixedReality* software that allows users to visualize the environment of robot

cells live on their smartphones to support fast, safe, and intuitive robot startups. The free mobile app displays tools and interference geometries for early detection of potential hazards that can then be eliminated before a robot even starts to work.

AR enables such intuitive robot startup assistance capability, connecting the real and virtual worlds to enrich the environment of robotic cells with clear, uncomplicated digital information. By quickly detecting and correcting errors, facilities accelerate installation and boost safety.

For example, the software will simulate robot motion along with a virtual gripper and detect any potential collisions that arise in the AR environment. These are then resolved at an early stage in the real environment so that neither the robot nor the gripper is damaged.

"Augmented or mixed reality is a future-oriented topic that also offers promising opportunities in robotics," said Roland Ritter, portfolio manager simulation at Kuka. "*Kuka.MixedReality* makes robot installation more user friendly and safe. This benefits customers at all levels of experience in the field of automation."

The *Kuka.MixedReality* Assistant app graphically displays all relevant variables directly for the robot in real time, including Cartesian or violated monitoring spaces, safety-oriented tools, and tool spheres. Users can also

view the corresponding configuration parameters of the spaces or tools.

Kuka.MixedReality is easy to set up and operate. Users simply install the *Kuka.MixedReality* Assistant on their smartphone or tablet via the Apple App Store or Google Play Store. All relevant information about the robot is transmitted directly to the mobile end device via WLAN through a router or access point—not a Kuka product—and displays visually on the mobile device. AR headsets or additional hardware are not required, and a *Kuka.MixedReality* safe technology package installs in the robot controller as a data source, along with one of the *Kuka.SafeOperation* technology packages to use with the safe functions.

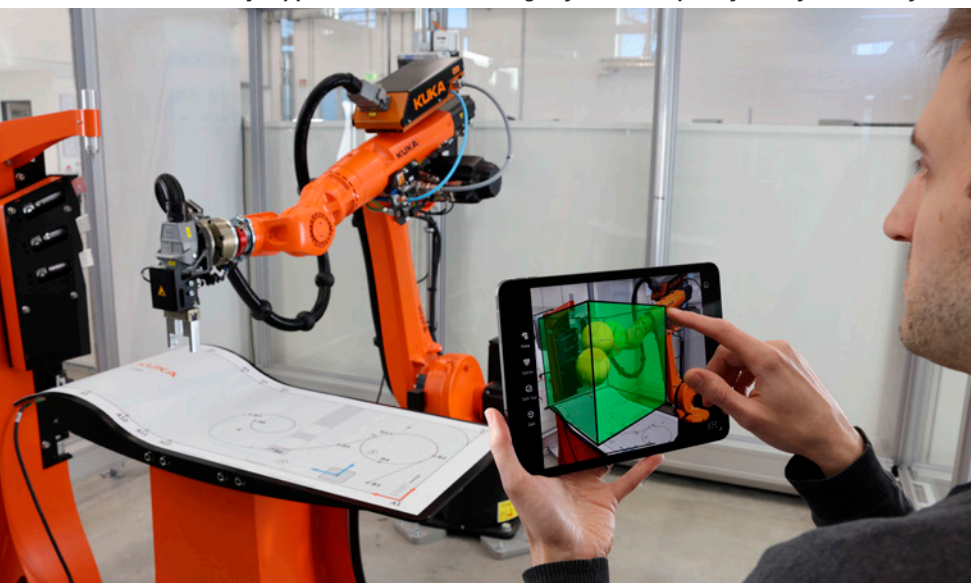
Monitoring Robotics in Real-Time

Automotive supplier Booster Precision Components GmbH saves time by efficiently planning maintenance work and transferring diagnostic files. The journey from the decision for *Kuka iiQoT* to a transparent overview of the entire robot fleet took a mere few days.

The implementation of *Kuka iiQoT* in a brownfield was quick and easy. On average, we needed about ten minutes per robot. "Now, through networking, we have the assurance that the displayed information is always up to date," says Tobias Sauer, head of automation at Booster Precision Components. The *Kuka iiQoT* dashboard bundles all important information transparently and clearly. This way, the robot fleet can be monitored from its location in Schwanewede, Germany—regardless of the robots' locations worldwide.

"With *Kuka iiQoT*, Kuka robots become smart robots. Thanks to the clear presentation of the robot fleet, notifications in the event of a fault, as well as status monitoring, our customers gain greater transparency and efficiency," explains Christian Büchle, platform product manager for Data-Driven Services at Kuka. Through intelligent data collection in the secure Microsoft cloud, customers can minimize machine downtime in their production operations

KUKA.MixedReality supports the commissioning of your robot quickly, safely and vividly.



and maximize operating time. For example, the necessary maintenance measures for the robots are transparently displayed in *Kuka iiQoT*, allowing harmonization for the entire robot fleet. Several *Kuka iiQoT* functions contribute to quick troubleshooting, such as condition monitoring, which records trends and irregularities. The customer-specific messages support troubleshooting by reporting critical events and fault hotspots for the robot.

Energy Efficiency in Motors and Drives

Sustainability is the name of the game yet many organizations are falling short of original decarbonizing targets. This by no means suggests sustainability is off the table—merely that companies need to reevaluate internal improvements, provide additional electric motor/drive options, and consider adjusting decarbonizing goals in a practical, realistic manner with an appropriate timetable. Industrial automation providers such as Fanuc, ABB, and Yaskawa America can provide a blueprint to help smaller organizations embrace energy efficient components and shop floors.

Components for the EV Sector

IKO International recently discussed new EV investments in an automated production infrastructure. There are aspects of EV manufacturing in which specifying an appropriate motion component requires particularly careful consideration. That's because the heart of the EV—the lithium-ion (Li-ion) battery—poses

safety and performance risks that you must keep in mind when selecting motion components. To minimize these risks, it's important to partner with a supplier that can help you select an appropriate device and offer modification options to meet the distinct requirements of Li-ion battery manufacturing processes.

Although copper is commonly used in Li-ion batteries, its hard-to-detect particles can contaminate the electrode and cause dangerous internal short circuits. Components used in Li-ion battery production should be free of copper-based substances and must not generate dust or dirt. In addition, moisture and humidity hinder Li-ion battery lifetime and performance.

Linear guides can function reliably in challenging environments—such as Li-ion battery manufacturing—with careful selection, protection, and proper lubrication. IKO has extensive expertise and a wide range of protective accessories available to create a custom product that will perform trouble-free.

Changing Markets for Robotics and Automation

In 2023, A3 reported the strongest demand for robots from non-automotive companies came from the metal industry, followed by semiconductor, electronics/photonics, food and consumer goods, life sciences, pharmaceutical and biomedical, plastics and rubber, and others.

While each of these industries showed an overall decline compared to 2022, the last three months of the year saw higher sales in automotive (both OEM and components), metals, semiconductor/electronics/photonics, plastics and rubbers, metals and the All Other Industries category, resulting in an increase of 20 percent over the previous quarter (Q3 2023). The All Other Industries category includes companies in areas such as construction, hospitality and agriculture, typically newer to robotics.

“While robotic sales were down over the year, 2023 ended with both an increase over the previous quarter and a nearly equal number of sales from automotive and non-automotive

companies,” said Jeff Burnstein, president of A3. “Both are promising signs that more industries are becoming increasingly comfortable with automation overall. While we expect to see automotive orders rise again, there's little doubt that orders will increase from all non-automotive industries as they recognize how robots can help them overcome their unique challenges.”

The potential offered by AI-enabled robotics is influencing sectors far beyond manufacturing, according to Segura at ABB Robotics Division. In 2024, these technologies are expected to bring substantial efficiency improvements to more dynamic environments, such as healthcare and life sciences, as well as retail. Another example is the construction industry, where AI-powered robotics can make a material contribution to boosting productivity, enhancing safety and sustainable construction practices while spurring growth.

“The construction industry is a great example of a sector where AI-powered robots will prove transformative, delivering real value by addressing many of the issues facing the industry today, including worker shortages, safety issues and stagnant productivity,” said Segura. “Abilities such as enhanced recognition and decision-making offered by AI, coupled with advances in collaborative robots enable safe deployment alongside workers,” Segura said. “These advances also enable robots to perform key tasks such as bricklaying, modular assembly and 3D printing with greater precision and speed, all while contributing to more sustainable construction by lowering emissions, such as concrete mixing on site, to reducing the need to transport materials across far distances with on-site assembly.”

Automate 2024 takes place May 6–9, 2024 at McCormick Place in Chicago.

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