

2025 Marks the Rise of the Flexible Manufacturing Robot

Robots are quickly expanding beyond dedicated robotic systems toward flexible humanoid robots.

AUSTIN, TX, UNITED STATES, February 13, 2025 /EINPresswire.com/ -- Is 100% Automation in Factory Assembly Achievable? Leading Manufacturers Say Yes



As factory automation continues to advance through robotics and cutting-edge technologies, the possibility of a fully automated manufacturing process is becoming increasingly tangible. Several leading manufacturers are making strides toward achieving a future where human workers are entirely integrated out of the assembly process.

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Many industry manufacturing sectors are readying their operations for an influx of new specialized robotic systems.”
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Denso, a leading Japanese Tier-1 automotive components supplier and member of the Toyota Group, has announced plans to build a state-of-the-art, fully automated facility in Nishio City, Japan, slated for completion in 2028. The facility, with a total investment of \$480 million, will operate without traditional human factory workers, marking a significant milestone in the evolution of automation in manufacturing.

Denso's new facility will feature a highly flexible production system, built upon extensive component standardization. This will enable the factory's production lines to seamlessly switch between different products, enhancing operational efficiency and scalability. The plant will operate unmanned 24 hours a day, supported by advanced computerized cameras and sensors that will oversee the movement of goods and materials. While a small human crew will be available on standby to handle repairs and troubleshooting, the factory's autonomous systems will manage day-to-day operations.

In addition to Denso's groundbreaking initiative, Hyundai Motor Company and Kia Corporation

are showcasing the future of robotic manufacturing with their E-FOREST smart factory initiative. In October 2025, both companies hosted a technology demonstration event, unveiling next-generation robotic solutions designed for complex automotive assembly tasks. Among the innovations was HOSE, an AI-based vision algorithm capable of identifying irregular flexible parts and selecting optimal handling locations. Another notable development was an automated alignment system designed to assemble the heavy wing components of Hyundai's upcoming urban air mobility (UAM) vehicles with a precision of 0.025 mm.

The Expansion of Specialized Robotics Across Industries

The push for automation is not limited to the automotive sector. Several industries are preparing to integrate specialized robotic systems into their production processes, showcasing the growing capabilities of robotics across manufacturing:

- **Aerospace Manufacturing:** Machina Labs, a company based in Chatsworth, California, is using robots to form, shape, trim, drill, and finish complex sheet metal parts for low-volume industries such as aerospace. This innovative approach replaces the need for highly skilled technicians to perform these intricate tasks.

- **Agriculture & Aquaculture:** In agriculture, robots like those developed by Greenfield are reintroducing traditional methods of weed control by using robotic hands to remove weeds. In aquaculture, Tidal, an Alphabet (Google) spin-off, has developed submersible robots to monitor



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salmon fish and invasive species like sea lice. Additionally, ETH Zurich researchers have created a swimming robotic fish designed to capture environmental DNA in oceans to monitor aquatic life.

- Environmental Cleanup: With plastic pollution becoming an increasing global concern, startups like Clearbot are utilizing solar-powered robotic boats to remove waste from waterways. These robots also have the capability to map waterways, test water samples, and even dislodge invasive species like apple snails.

- Food Production: Robotics is also revolutionizing the food production sector. Companies such as GoodBytz and BotInKit are developing robotic kitchen systems that replace commercial kitchens, while robots at Smithfield Foods are taking on dangerous jobs, such as slicing pork ribs. Tyson Foods has similarly introduced automation at its Danville, Virginia plant, replacing 250 workers in the production of chicken nuggets and other processed poultry items.

The Future of Robotic Manufacturing: Innovation in Self-Repair and AI Logistics

The automation trend is pushing the boundaries of what robots can do, not only in manufacturing but in self-repair and logistical tasks. At Agility Robotics' new RoboFab facility in Oregon, robots are being developed to build and repair themselves at automated factories. Researchers at institutions like Cornell University and Carnegie Mellon University are exploring self-healing polymers that enable robots to repair themselves when damaged.

Robotics are also enhancing warehouse logistics. AI-based robotics companies such as Convergent Brain are training large language models to improve robotic understanding of material handling tasks, while companies like BrightPick are developing fully automated warehouse systems. These innovations are already helping companies like Amazon streamline logistics, reduce delivery times, and predict customer orders before they are placed.

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