



Festo Integrated Automation Solutions Streamline Semiconductor Wafer Production

News Release

Festo demonstrates a seamless flow of wafers picked, aligned, and transported to wet chemistry or a vacuum-based process.

Media Contact:
Marketingmgr.us@festo.com

ISLANDIA, N.Y., October 2, 2025 — Festo demonstrates an interconnected workflow for semiconductor manufacturing, focusing on critical wafer handling and processing.

The Central Hub: Wafer Handling and Alignment

The heart of the new Festo application demonstration is the central hub, where the journey begins with a semiconductor wafer. The hub module features an inverted gantry, a cost-effective alternative to traditional SCARA robots for wafer pickup and transport. The gantry picks wafers from a transport carrier known as a FOUP (Front Opening Unified Pod) and moves them with speed and precision. This provides a fast and reliable way to transfer wafers from storage to the processing line.

The gantry uses a unique wafer end effector with an integrated wafer aligner. This tool is revolutionary because it combines two functions—gripping the wafer and aligning it perfectly—into a single, compact device. This reduces the complexity of the equipment and ensures the wafer is positioned with sub-micron accuracy before it is transported to the next step in the process.

Festo Corporation

1377 Motor Parkway
Suite 310
Islandia, NY 11749
Tel: 631.435.0800
Fax: 631.231.9215
www.festo.us

Wet Chemistry and Coating

After being handled by the central hub, the system has the option of moving the wafer to Module 1, which simulates wet chemical processes. The process begins with a FOUP purge, using a Festo MFC (Mass Flow Controller) to ensure the wafer environment is clean and free of contaminants before it's even touched.

The wafer is then loaded onto a coating station. Here, a Festo "suck-back" solution is used in combination with an electric linear axis to precisely move a nozzle across the wafer surface. This system ensures an even coating of chemicals, reducing waste and improving product quality.

Vacuum and Micro-Positioning

Alternatively, the wafer can be transferred to the wafer handling module (Module 2), which demonstrates processes that occur in a vacuum environment, like dry etching. This module shows how Festo technology can control the opening and closing of slit and gate valves gently, allowing the wafer to transition smoothly into the vacuum chamber.

Inside the chamber, a pneumatic pin lift carefully raises the wafer onto a chuck. The display also highlights a pneumatic micro-positioning system that can place a focus ring with micrometer-level accuracy, demonstrating the fine-tuned control required for advanced semiconductor manufacturing.

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This interconnected demonstration shows how Festo's innovative components—from cost-effective gantries to integrated aligners and precise fluid control systems—work together to enhance throughput, accuracy, and reliability in modern semiconductor production.



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Festo plays a significant role in the semiconductor industry, providing critical components and solutions for both front-end and back-end processes. Festo solutions include precision and gentle handling, highly efficient nitrogen (N2) purge systems, cleanroom-compatible components, digitalization, AI process and predictive maintenance innovations, and industry-leading training and workforce development programs.

For more information, visit the [semiconductor page](#) on the Festo website under the Solutions dropdown menu, or speak with a Festo sales representative or distribution partner. For more information on the advantages of working within the Festo ecosystem to leverage less engineering overhead, faster time to market, seamless connectivity, and high-quality components, visit www.festo.com.

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The demonstration modules show an integrated automation solution that streamlines semiconductor wafer production.

About Festo U.S.

Festo is a leading manufacturer of pneumatic and electromechanical systems, components, and controls for process and industrial automation. For 100 years with more than 50 in the U.S., Festo Corporation has continuously elevated the state of manufacturing with innovations and optimized motion control solutions that deliver higher performing, more profitable automated manufacturing and processing equipment. Through advanced technical and industrial education, Festo Didactic Learning Systems and its partners prepare workers for current and future manufacturing technologies.

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