

Pasta Maker Showcases Integrated Robotics

Barilla's flagship pasta manufacturing plant in Parma, Italy, boasts a fully automated, lights-out distribution facility, equipped with 120 laser-guided vehicles and 35 robotic systems.

FAMILY OWNED since 1877, Barilla is the world's leading pasta maker—more than 160 shapes and sizes sold in more than 100 countries. In Italy, it accounts for 45% of the pasta market, and 35% in the U.S. market. In addition to pasta, Barilla owns 16 brands in related product categories such as sauces and breads.

While steeped in history, Barilla is no stranger to technology. The Italian pasta maker is using connected technologies and analytics to improve traceability in its supply chain. Its field-to-fork initiative tracks all stages of food production—from local harvesting to storage, processing, packaging, distribution, and even consumption.

Barilla has been an early adopter of sustainable practices in its facilities. More than two-thirds of the electricity used in Barilla plants comes from renewable sources. Since 2010, Barilla facilities have

reduced water consumption by 21% and greenhouse gas emissions by 30%. The company also promotes more sustainable agricultural and farming practices for its suppliers.

Robotics-integrated distribution

It was amid this culture of technology and environmental initiative that Barilla announced plans in 2018 to invest €1 billion over five years into its industrial assets, aimed at boosting sustainability by optimizing processes and technologies. A pivotal focus of this plan was transforming the distribution operations of its flagship pasta production facility in Parma, Italy, into a showcase of integrated robotic processes and energy conservation.

Highly automated flexible systems enable Barilla to respond to the needs and capabilities of the facility, notes Alessandro Spadini, plant director for the Parma facility. "Any distribution system that is not sufficiently flexible, that is based on a rigid scheme, sooner or later, will become an issue," he says.

An essential part of the distribution project is the systemic integration of the project rather than single, discrete systems, according to Spadini. To realize this strategy, Barilla called on E80 Group to create the all-encompassing solution. E80 has enabled a 430,000-sq-ft distribution facility that is fully automated, lights out, operating 24/7/365. It's equipped with 120 laser-guided vehicles (LGVs), and 35 robotic systems, including high-density automated storage and retrieval systems (AS/RS), palletizers, labelers, and stretch wrappers. In 2019, these systems combined handled 438,000 tons of pasta; about 1,000 different packaged SKUs.

LGVs as conveyor alternatives

A key impetus of this renovation project was the wish to replace conveyors with LGVs for pallet transport within the facility, Spadini notes. "Traditional conveying systems are sized for production peaks and not flexible enough to manage variations



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Barilla's flagship plant in Parma, Italy, operates 120 laser-guided vehicles.

in throughput, in terms of both flows and volume,” he says. “Therefore, pallet conveyor systems are typically highly inefficient.”

The Parma facility uses three main types of LGVs—carrying a single pallet, two pallets, or four pallets at a time. The LGVs interact with floor-positioned pallets and AS/RS induction stations. They pick up and drop off pallets between receiving and manufacturing, palletizing, stretch wrapping, labeling, finished-goods warehousing, and staging locations for shipping. Roller beds on the LGVs allow efficient roll-on/roll-off.

Each LGV is equipped with a rotating laser that scans 360 degrees around the vehicle for laser targets mounted on columns, walls, and stationary machinery. The reflections from these targets are triangulated to determine position, which is compared to a CAD-type map stored in the LGV’s memory.

Developed for E80, lithium Flash Battery technology provides a high level of performance for industrial vehicles. The lithium iron phosphate delivers low toxicity, well-defined performance and long-term stability. Having a very constant discharge voltage, Flash Battery technology delivers virtually full power until the battery is discharged.

Integrated system controls

Running the LGVs, as well as all integrated robotics systems within the Parma distribution facility, is E80’s Smart Integrated Logistics (SM.I.LE80) controls platform. SM.I.LE80 continually updates the positional status of each LGV—including whether it is loaded or unloaded, emergency stopped or soft stopped, operating in manual mode, and battery level. An HMI screen gives the operator a graphical overview of the LGV locations in the system and monitors each in real time.

The SM.I.LE80 controls ensure the integrated and automated management of systems, communicating with AS/RS, palletizers, wrappers, and shipping staging locations. The entire LGV logistics flow within the Parma distribution operation can be centrally managed from this platform.

Barilla’s high-density automated warehouse—where six stacker cranes support 47,000 pallet locations—integrates perfectly with the LGV technology. E80’s AS/RS Crane Store systems are equipped with automatic product handling devices



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for double-depth storage. Because they can operate at heights of up to 130 ft, these systems significantly increase warehousing capacity. An additional 50,000 pallet locations are used for LGV drive-in high-density low-bay storage.

In addition to managing LGV traffic and the other integrated robotics systems, SM.I.LE80 maintains control and identification of each case of products throughout the distribution facility. Once cases and pallets leave the facility, the labeled identification provides a tracking mechanism for complete track-and-trace throughout the supply chain.

Pallet-free robotic palletizing

Barilla’s facility uses a unique palletizing process. Robotic palletizing stations form cases in palletized configurations directly on the palletizers’ platforms. The configurations are then moved onto LGVs and transported to other end-of-line process stations in the facility, where a pallet is inserted underneath prior to storage and shipping.

This removes wood pallets from much of the operating area. “Removing wood from production and many distribution areas means removing an element that may pollute the environment where we produce and package our products,” Spadini points out. “But also, managing pallets without wood parts opens up the opportunity of handling and reprocessing of pallets in a completely automated way, improving efficiency and minimizing environmental impact.”

As with the other systems in the distribution operations, Barilla’s end-of-line stretch wrapping and labeling are also robotic and fully integrated with the LGVs and other robotic processes. The high-speed stretch wrappers employ automatic wrapping head changeovers, eliminating the need to stop production. 🌱

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