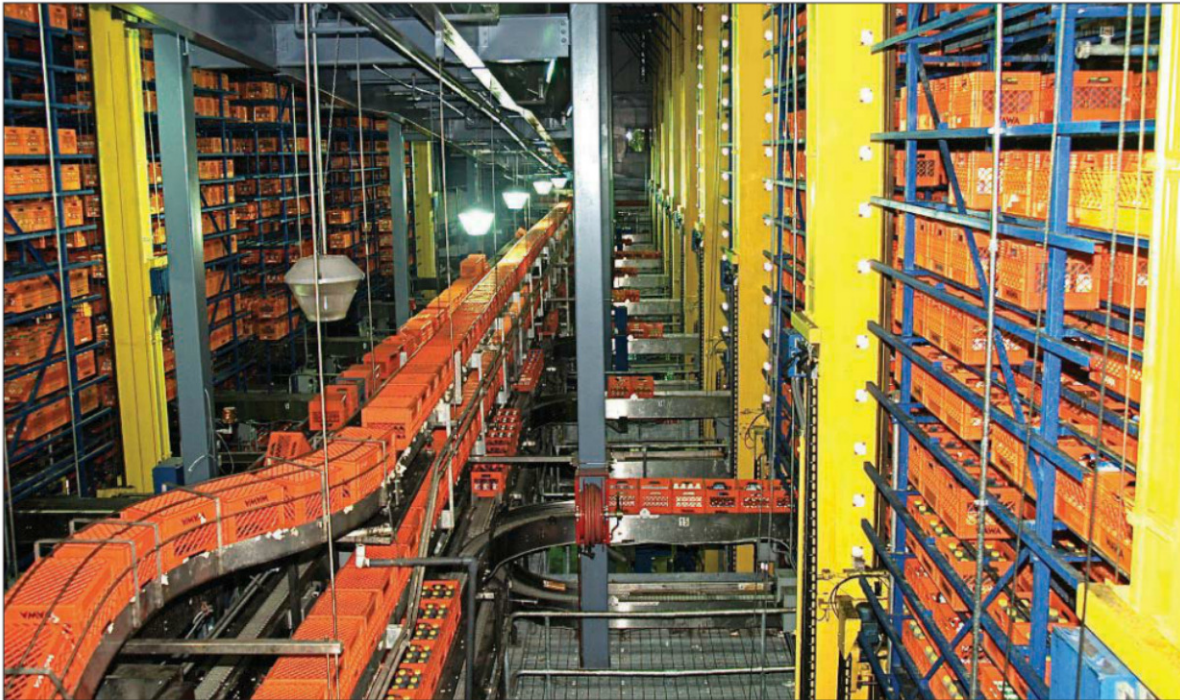


Wawa's Warehouse Keeps 580-Store Milk Run on Schedule



Wawa's 35-foot chilled high-bay achieves high-density space utilization.

A high-bay chilled warehouse serviced by 16 automated mini-load stacker cranes and a warehouse management system keeps convenience stores stocked with liquid milk, teas and juices at a rate of 42,000 crates a day.

By Patrick Roberts

Wawa's (www.wawa.com) dairy convenience stores are seemingly on every major thoroughfare in the mid-Atlantic states. With 400 million customers annually, keeping the chain's 580 stores stocked is a serious logistics challenge. Nowhere is this challenge more critical than with the warehousing and distribution of its fresh liquid milk products, as performed by the chain's high-volume distribution center in Wawa, Pa.

Few consumer food products require as many time and temperature controls from production through warehousing and distribution to their arrival on retailers' shelves as dairy products. Fresh liquid milk must be distributed within days, and some of Wawa's milk products are moved through its distribution center and shipped within a few hours after being filled and packaged.

The Need for Automation

Achieving this speed of throughput became more difficult for Wawa as its business continued to expand. The company

was adding new stores, and its manually-operated chilled warehouse ran out of room. Its production outpaced its storage capacity. The company's products were now being produced, staged on the warehouse floor and quickly shipped to make room for milk, teas and juices that were just coming off the line. The distribution center's storage space had surpassed maximum capacity and it was running out of space on the floor to stage products.

"The challenge was where to put the product," says David Mann, manager of Wawa's beverage warehouse. "Where do you store it? Basically, the plant would produce to ship. It wouldn't ever produce more than could be shipped over the next day. There wasn't any more room on the floor to stage it."

To find a solution to this logistics challenge, and satisfy the need for speed and high throughput, Wawa worked with Swisslog (www.swisslog.com) Warehouse and Distribution Solutions to engineer and install a system that would meet its requirements. Swisslog put into place an automated storage and distribution solution that would provide adequate storage capability and better ensure timely and accurate handling for all of its liquid products including milk, teas and juices.

High-Bay Warehouse

Wawa's solution focused on building a high-bay refrigerated warehouse, serviced by 16 high-speed, fully-automated storage and retrieval mini-load stacker cranes that move crates in and out of the 35-vertical-foot, high-bay racking. The high-bay/mini-load system receives crates filled with milk, teas and juices from upstream production, stores up to 80,000 crates in the system, then selects and releases crates to fill pick orders for shipping. The storage and retrieval functions are automated, without the need for direct human intervention.

Major benefits for Wawa's warehouse switching from a manual to an automated high-bay chilled facility are maximized building volume and increased cost efficiency. Wawa's high-bay can handle a greater number of crates, but in a much smaller footprint. Of equal importance, the footprint reduction becomes an increasingly important factor in energy savings since much of the cold loss in a chilled warehouse occurs through the roof. Chilled warehouses are giant insulated refrigerators which extract heat to produce a chilled environment. The removal of heat comes at a hefty energy cost. Having a smaller roof footprint in a refrigerated warehouse presents a considerably better energy solution.



Wawa's distribution facility can automatically handle 42,000 crates of liquid products daily.



Wawa's mini-load stacker cranes move crates in and out of the 80,000-location high-bay.

The most energy and cost efficient high-bay, chilled warehouses achieve high density space utilization. This means they have a space configuration that allows for the maximum number of crate positions to fit into the facility.

Wawa's high-bay optimizes cubic space usage, not only by its vertical stacking capability, but also by minimizing aisle cubic footage. By eliminating the need for lift trucks, aisles can be made significantly more narrow—allowing 12-foot-wide aisles to become just 5-foot-wide. This space can then be used for more crate positions.

Mini-load AS/RS

The mini-load stacker cranes at Wawa are light, high-speed computer controlled automated storage and retrieval systems (AS/RS) for automatically depositing, storing and retrieving crates from defined storage locations. They allow inventory to be moved quickly, safely and precisely within the chilled warehouse.

The cranes are equipped with a duo fork capable of transporting up to eight crates simultaneously, both for putting product into the high bay and for retrieval for picking.

When a pick order is initiated, a crane moves to the designated high-bay location, selects the crates and deposits them on a conveyor at a pick station where 54-crate blocks are prepared in the required shipping order sequence. The crane then automatically moves to fulfill the next order.

Wawa's mini-load cranes use an integrated controls architecture for material flow control, enabling speed and precision positioning. These controls instruct the cranes where to place incoming crates, and where to retrieve them for picking.

The direct integration of the warehouse management

system (WMS) ensures that Wawa's mini-load stacker cranes always select the correct inventory and item numbers, which rotates the product inventory properly.

The high-bay/mini-load system provides rapid response to Wawa's storage and retrieval needs.

WMS with Load Tracking

Wawa's WMS, in coordination with PLCs in the mini-load cranes, is capable of monitoring batch numbers, production dates and weight as the crates are stored and moved through the facility.

"Everything that we operate in the warehouse is driven by the WMS," Mann says. "From the moment the products come off the production line, through storage and through shipping."

The WMS knows precisely what the product SKUs are and how many of those crates are entered into storage. This ensures optimized storage for Wawa by distributing SKUs over its 16 aisles, improving delivery execution and maximizing labor resources.

The WMS is integrated with Wawa's ERP to monitor and streamline orders automatically straight through to shipping.

System Performance

Wawa's distribution facility can automatically handle 42,000 crates of liquid products daily (2,400/hr), operating with a system uptime rate exceeding 99 percent, and an order accuracy rate topping 99.9 percent, while functioning in a chilled 35° F environment.

"The high-bay and automation has enabled us to do larger runs," explains Mann. "And we do fewer runs of product because of the additional storage."

The automated solution was initially put into operation in late 2000, but has had ongoing upgrades to maintain its performance and efficiency.

Twenty Hours Every Six Days

The mini-load cranes run almost continuously, with virtually no loss of performance. Wawa maintains one Swisslog technician per shift on-site to ensure the 16 mini-load cranes and WMS are operating at peak performance and to regularly implement system upgrades.

"After many years of usage, the mini-loads and WMS are still performing very well," continues Mann. "We have done numerous upgrades on the systems. Over the years we have had no significant downtime. The uptime on the equipment is outstanding."

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Patrick Roberts writes on logistics automation.