

CASE STUDY

Flash Fulfillment Solution Leads to More Efficient E-Commerce Processing

As the e-commerce market continues to grow, flexible fulfillment solutions are needed to improve the order-filling process, reduce labor costs and improve space utilization.



Challenge

Retail sales, including e-commerce sales, continue to remain strong, indicating a resilient economy. The National Retail Federation predicts that adjusted U.S. retail sales for 2021 will range from \$4.44 trillion to \$4.56 trillion. This is up more than 10% over a year earlier. Online sales are estimated to range between \$1.09 trillion to \$1.13 trillion. This falls right in line with U.S. Census Bureau data, which indicates e-commerce sales have been expanding at a rate of 15% annually; a trend that is expected to continue.

As online sales increase, the use of efficient order processing systems will also continue to grow. Suppliers, distributors and fulfillment center operators are updating and expanding facilities to meet consumer demand for products whether by adding new capacity, improving automation, upgrading technology and/or better utilizing existing spaces.

One solution designed to handle e-commerce fulfillment in a more effective and sustainable way is the highly customizable multitemperature order fulfillment facility. This type of facility addresses a variety of logistics challenges, including managing

Project Stats

Client Confidential

Location Midwest

ORDERS FILLED PER HOUR





labor shortages and costs; streamlining operations and improving time efficiency; providing better inventory control; and reducing overall operational costs.

Solution

Burns & McDonnell has a wealth of experience in design and construction for prepared foods, retail/grocer, cold chain logistics, warehousing and fulfillment facilities.

Our team provided comprehensive consulting and overall life cycle planning as well as design, engineering and construction services for a confidential client's flash fulfillment facility project. Specifically, we performed operations assessments such as task analysis, process storage mapping, dock management and location comparisons, as well as an examination of current and projected cash flow and operational costs. Other services included scoping, modeling and site simulations.

To begin, our engineering and design teams conducted comprehensive human cycle time analyses to understand the ins and outs of each task to customize machine timing and automation capabilities. Using this data, our team completed a complicated engineering design that addresses diverse product fulfillment options.

Flash fulfillment processing can be more efficient than the manual fulfillment practices at traditional facilities. By using multi-SKU processing the order fulfillment system can be as simple as a two-touch process, with all other steps being automated. Putting stock items away and loading parcels on trucks are often the only manual operations. More traditional processing might result in products being touched seven or eight times before the order process is completed.

Instrumental to the reduced-touch processing is a shuttle-based Automated Storage Retrieval System (ASRS) that is centered around flexible tote- and tray-based automation. Specifications for the ASRS: 400 feet long, 55 feet tall, 6 aisles, 100,000 storage positions and climate-control temperature settings — for frozen, chilled and ambient conditions — using 180 automated shuttles processing 5,500 order lines per hour.

The 145,000-square-foot flash fulfillment facility includes space for automated processing: robotic picking and packing; dry ice generation; dunnage; case closing; box trimming; and print-on-the-fly package labeling and branding. These automated features help maintain high-level processing while also aiding in managing a national labor shortage. In fact, each flash fulfillment facility system can deliver more than 3,200 orders per hour with very lean staffing requirements, reducing traditional staffing by 60%-70%.

The facility design also incorporates a manual pack-out system that is 100% redundant, so if packaging types have very high variability, packages can be closed and labeled manually. One of the most impressive features of the flash fulfillment facility is the ability to complete order processing for multitemperature needs. The picking design allows for the handling of objects as diverse as grocery items, frozen foods, consumer products and pharmaceuticals.

One of the most challenging components of the project was engineering a system that would address dry ice production. Because of the increased amounts of frozen products to be shipped, the facility would need a system that could produce up to 6,500 pounds of packaged dry ice per hour on demand. The logistics for making the right amount of ice at just the right time involved precise equipment, storage systems and logistical considerations for bulk liquid CO₂ supply.

Another key attribute of the flash fulfillment facility is that facility operators can do more in less space. Multitemperature automated order processing centers don't have to be large facilities in industrial parks with other distribution, warehouse and fulfillment sites. Operations such as this can be in downtown areas or other urban locations that have size limitations and footprint constraints.

Results

The flash fulfillment facility concept has opened the door to a more efficient, customizable solution that can meet the urgent needs of a variety of fulfillment owners. As e-commerce sales rise and labor shortages worsen, the need for efficiency, automation, reduced footprint and cost savings are paramount for fulfillment centers across the globe.

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