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THE E-GROCERY EVOLUTION: MOVING AUTOMATED FULFILLMENT FROM STRATEGY TO EXECUTION







NAVIGATING THE DYNAMIC E-GROCERY MARKET

The speed at which e-grocery volumes have grown has been astounding. Going from 3% of total grocery sales entering 2020 to <u>10% of sales</u> <u>at the end of 2021</u>, the shift to online ordering has demanded the attention of virtually every grocery operator.

When volumes first surged in early 2020, grocers felt a sense of urgency to quickly automate order fulfillment closer to customers through micro-fulfillment centers (MFCs) and related strategies. However, as they began making plans to implement MFCs they were confronted with the inherent complexity of automating e-grocery fulfillment. There were multiple high-stakes decisions to be navigated with little industry experience to fall back on.

A few grocers were able to navigate these complexities and implement successful MFCs and larger e-grocery fulfillment centers (EFCs), but most put their plans on hold while they continued to monitor the market and refine their strategies. Now, armed with a better understanding of the issues and the experience of early adopters, many of those are ready to move forward.

As the e-grocery fulfillment partner with the most experience implementing successful MFCs and EFCs, Swisslog has developed this e-book to capture and share the lessons learned and best practices that emerged during the initial phase of the e-grocery evolution.



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REACHING THE POINT OF NO RETURN

Grocers have bought time in responding to e-grocery order growth by fulfilling orders through in-store manual picking, performed by store personnel or outsourced to third parties. This has enabled a more strategic and analytical approach to e-grocery automation than was possible early in the pandemic while also exposing the limitations of manual picking as a long-term strategy.

Manual picking becomes less efficient in relation to automation as order volumes grow, creates congestion in aisles that can alienate in-store shoppers, and can be crippled by the changing labor profiles in many markets. It also reduces a grocer's ability to adapt to changing consumer behaviors and expectations.

As consumers get more comfortable with online grocery shopping, they will place smaller, more frequent orders, putting further pressure on the productivity and efficiency of in-store picking. MFCs and EFCs enable greater agility in responding to changing order profiles because the **automation systems** deployed in these facilities provide the flexibility to scale throughput and inventory independently.

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) REACHING THE POINT OF NO RETURN

Pressure is growing to compress fulfillment times as e-grocery experiences a similar evolution as was seen in the broader e-commerce market. This move to shorter pickup/delivery times is occurring much faster in the e-grocery segment than it has in other segments. In e-grocery, fulfillment times are now measured in hours and minutes rather than days. Automation providers have leveraged the experience gained in the broader e-commerce market to develop e-grocery solutions that combine the speed of automation with the flexibility of manual systems to meet the demand for short lead-time orders economically.

As a result, as order volumes grow, automation not only helps protect margins but also improves the ability to deliver a market-competitive offering. That is making it easier to develop a solid business case for automation, informed both by new insights into how the market is evolving and realistic performance expectations based on the experience of early adopters and their automation partners. These business cases are driving the next wave of MFC and EFC implementations.

With customer expectations higher than they've ever been, it's vital to have the right technology in place to provide the flexibility needed to get products to the consumers when they want them.

When automation first emerged as a viable option for e-grocery fulfillment, there was significant debate about where fulfillment should be located in relation to customers and stores. Was it better to put it at the store level to allow the fulfillment center to leverage store inventory, or more advantageous to create larger fulfillment centers serving multiple stores to enable economies of scale?

Today those questions have been answered: the distribution strategy should be driven by order volume. With the performance and cost data available from successful MFCs and EFCs, the order volumes required to justify the investment in automation are now known and can be balanced with distance to the consumer to develop the most cost-effective distribution strategy for a particular area. This has brought much-needed clarity to the development of e-grocery distribution strategies, with three models emerging to meet the needs of most operators.

> With the performance and cost data available from the investment in automation are now known.

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With the performance and cost data available from successful MFCs and EFCs, the order volumes required to justify

EFC

In markets where individual retail locations do not have the volumes or the available space to support an MFC, an EFC can support fulfillment across multiple retail locations. In one EFC scenario, the automated fulfillment center assembles orders for all non-specialty items and then bulk ships those orders to the stores where they are topped off from store inventory. An EFC can also be attached to a retail store, allowing full orders to be completed and shipped to satellite stores with lower order volumes. Some operators are also deploying standalone EFCs that support multiple stores while also enabling customer pickup and delivery from the EFC.

EFCs allow the fulfillment facility and automation system to be designed hand-in-hand and eliminate the space limitations imposed by integrating automation into existing retail locations. They also offer the flexibility to tailor the distribution strategy to varying order volumes across stores in a particular market but create an extra layer of transportation that can add to costs and limit the ability to support short delivery times.



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Store-Level MFC

In markets where order volumes by store are high, it can make sense to bring automation directly to the store using available storage space within the store, through store compression to create space or by adding an MFC to the back of the store.

This scenario will typically represent the fastest entry into the e-grocery automation space even if modifications to the store are required. It focuses on fulfilling products that represent about 90% of sales through the fulfillment center, avoiding the larger investments required for the final 10%, which can be picked from the store. It also minimizes transportation costs associated with order fulfillment.



Dark Store

The shifts in the retail landscape created by e-commerce have created opportunities to convert abandoned or underperforming retail outlets into fulfillment centers that serve the same area as a traditional grocery store with automated fulfillment for curbside pickup or home delivery. This strategy is attractive to pure-play e-grocers who don't have retail stores that can serve as fulfillment hubs. It also allows grocers with an existing footprint a way to streamline their supply chain to customer flow.

Swisslog brought together AutoStore, optimized by Swisslog's SynQ software, to create a flexible automation solution for The GIANT Company.

> AUTOMATION CONSIDERATIONS AND RECOMMENDATIONS

One of the most important decisions grocers face as they move forward with their e-grocery strategies is selecting the right automation technology—and the right partner to implement that technology.

Here again, the experience gained over the last several years has eliminated the uncertainty that existed previously around automation. In addition, partners capable of optimizing automation performance in MFC and EFC environments have emerged.

Application Considerations

The core concept behind the automation systems used in MFCs and EFCs is goods-to-person picking. Instead of pickers walking up and down warehouse or store aisles to pull orders, goods-to-person automation systems allow the picker to remain stationary. The automation system delivers products in bins to the picker as they are needed to fill orders. Pick time is thus reduced significantly, accuracy is improved, and pickers experience less fatigue.

Goods-to-person automation systems used in MFCs and EFCs must have the following characteristics:

Density

The combination of the high number of SKUs required to support fulfillment and the limited space available makes storage density key for MFC and EFC environments. High-density systems also maximize the utilization of the high-value real estate required to support MFCs in densely populated areas. A lower density system can limit the percent of basket that can be fulfilled through automation and force more frequent replenishment.



Sustained Throughput

One of the keys to success in e-grocery fulfillment is maintaining consistent productivity throughout the week. It is less important to evaluate the peak throughputs a particular system can achieve and more important to determine the sustained throughputs it can deliver over a weekly order cycle. An experienced automation partner can project sustained throughput for a particular automation system based on the inventory and order profiles.

Application Flexibility

Getting the most out of limited space is critical to maximizing the value of an MFC or EFC investment. Automation technologies that can adapt to the size and shape of the space are especially valuable in smaller facilities.

Scalability

Growth can come in various forms and the ability of an automation system to independently scale throughput and inventory allows MFCs and EFCs to adapt to volume growth or order profile changes.

Reliability

Because MFCs and EFCs are distributed across the retail network, they typically lack the dedicated maintenance support that exists in centralized facilities. Systems in which a single failure can limit access to a block of inventory can cripple the ability to fulfill orders for days. Automation systems that have low maintenance requirements and can withstand failures without limiting access to inventory can significantly increase the reliability of order fulfillment operations. Swisslog explains how having sustained throughput throughout the week, as well as automation technology that can meet the needs of that throughput, provides much needed operational flexibility.

> AUTOMATION CONSIDERATIONS AND RECOMMENDATIONS

The Right Choice for MFCs and EFCs

When evaluating these factors, grocers that have deployed successful MFCs and EFCs have reached the same conclusion: the <u>AutoStore system</u> optimized by Swisslog SynQ software delivers the best balance of density, sustained throughput, flexibility and reliability.

AutoStore is a compact, robot-based automated storage and retrieval system that has low maintenance requirements and maintains access to all inventory if a robot has to be taken offline. Unlike with shuttle systems, each robot can reach any bin in the system. Fast-moving products naturally migrate to the top of the grid and advanced slotting strategies can be employed to enable fast bin presentation speeds. Its unique cube design, in which storage bins are stacked vertically up to six meters high, provides the highest storage density in most MFC and EFC environments.



"We evaluated goods-to-person automation based on multiple factors, including reliability, flexibility, ability to deploy close to the customer, maturity and productivity. The multiple single points-of-failure in shuttles were a big factor that led us to deploy AutoStore."



- Leading grocery chain

> AUTOMATION CONSIDERATIONS AND RECOMMENDATIONS

The architecture of the system also allows a high degree of design flexibility. It can be constructed around pillars and in irregular shapes to take maximum advantage of available space. Port locations are flexible as well and can be placed anywhere within the grid. It can even be configured to create tighter integration between manual and automated picking by mounting the system on a mezzanine with fast-moving and perishable products positioned under the mezzanine.

Finally, AutoStore creates a future-proof automation platform that adapts to changing requirements and emerging technologies. Additional storage capacity can be added modularly to accommodate more inventory, robots can be added to increase throughput, and pick stations can be equipped with item-picking robots as that technology matures.

> AutoStore creates a future-proof automation platform that adapts to changing requirements and emerging technologies.



MANAGING ORDER CONSOLIDATION

When e-grocery fulfillment is limited to curbside pickup, order consolidation and staging can be relatively easy to manage. But when fulfillment hubs are supporting pickup as well as delivery to customers and retail spokes, consolidation and staging gets complex. Managing the timing of orders across the various modes can create confusion and requires more space than many sites have available.

This is increasing the focus on consolidation in e-grocery fulfillment center planning with some grocers choosing to automate consolidation as well as fulfillment. **Shuttle systems** have proven to be an ideal consolidation engine for e-grocery automation and are being paired with AutoStore systems to support automated fulfillment and consolidation.

In this configuration, orders filled from ambient and chilled AutoStore systems, as well as the manually picked component of an order, are loaded into a shuttle system. The shuttle then manages consolidations based on pickup and delivery schedules. Sequencing from the consolidation engine can even synchronize delivery van drops, saving time and costs at the loading dock.

The consolidation engine also provides operators the flexibility to smooth out peaks in demand by pre-picking orders and storing them in the shuttle until they are needed. As e-grocery becomes more competitive, grocers who focus on consolidation as well as fulfillment will be better positioned to scale and meet changing expectations.



ESSENTIAL SOFTWARE CAPABILITIES

With a growing consensus that AutoStore is the best choice for e-grocery fulfillment, getting the hardware right has become the easy part of MFC and EFC implementations. While multiple solution providers support AutoStore, there can be meaningful differences in the functionality and maturity of the software used to control the system. Those differences can make or break the success of an e-grocery fulfillment center.

Synchronizing Automated and Manual Processes

While e-grocery presents fulfillment challenges in regard to the range of different types of products that must be assembled to complete an order, it's common within many warehouses to support automation systems with some degree of manual picking.

A modular software platform, such as <u>Swisslog's SynQ</u>, provides the flexibility to be deployed as a single platform that encompasses WMS and warehouse execution system capabilities or to integrate the platform's warehouse execution system with the existing WMS. SynQ also integrates easily with ERP, e-commerce and order management platforms. When operating as the WMS, SynQ provides single-system control and orchestration of all the processes and systems within the fulfillment center.

Swisslog's SynQ software can be deployed as a single platform that encompasses WMS and warehouse execution system capabilities or to integrate the platform's warehouse execution system with an existing WMS.

Inventory and Material Flow Management

Some software control systems being marketed for e-grocery applications do not have the inventory management and material flow capabilities the application requires.

One way to tell whether software is tailored to e-grocery requirements is whether it can manage local inventory in real-time based on shelf life and expiration dates. Many systems will simply select the bin that is easiest to retrieve, regardless of expiration dates or other factors. True e-grocery software will have the ability to select bins containing products with the earliest expiration or best-by date, reducing the risk of product expiring in the automation system. This capability can also be employed to select bins with the fewest number of products that can complete the order to prevent excessive fragmenting of inventory.

The software should also enable complete order tracking, including automated and non-automated picking processes and support easy integration of essential equipment, such as weigh scales. Due to the order volumes experienced in e-grocery, the ability to track fast-moving inventory can be valuable as can the ability to organize consolidation based on pickup and delivery schedules.







Maximizing Employee Productivity

The goods-to-person fulfillment strategy delivers significant productivity improvements compared to manual processes. However, specific software capabilities can further enhance the productivity of the automation system.

For example, does the software enable orders to be pre-picked during non-peak times and then re-entered into the system and retrieved close to pickup/delivery time? Does it enable easy and efficient exception handling? Can operators easily reconfigure bins during replenishment to adapt to changing inventory levels? All of these capabilities can enhance the efficiency of a fulfillment center.

The design of the user interface can also impact productivity. Operator and supervisor interfaces should be designed to present necessary information simply, visually and intuitively to minimize training and maximize productivity. When interfaces are consistent across different processes, workers can move fluidly between automated and manual picking. While the interface is standardized, the information presented to operators should be customizable based upon the specific application and optimized for ergonomics and simplicity.

Automation enables a more ergonomically enhanced working environment for individuals, as well as overall higher pick rates for the company. In fact, people often find the automation easier to work with than they may have originally thought.

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Data Analytics

Other features that could be valuable include 3D visualization and business intelligence tools. Three-D visualization presents a simple, holistic overview of the system at any point in time while business intelligence tools provide a dashboard view of key performance indicators and simplify system health monitoring.

E-grocery Experience and Software Maturity

Solutions providers that have established EFC and MFC implementations are better equipped to help grocers navigate the complexity of e-grocery fulfillment. These providers are also able to offer more mature software that has been tailored to the requirements of e-grocery and proven in real-world implementations.

Swisslog, for example, has installed more AutoStore systems across all applications, and in e-grocery fulfillment centers, than any other organization. This experience has resulted in robust and mature AutoStore management software that is grocery-ready out-of-the-box.





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	mi location occupancy by profile - highbay - ambient			-
	Location Profile 1	Occupied Capacity	Tetal Locations	Occupied Locations
92.8 %	HB_STORAGE_LOCATION_1_750	89.3 %	6,632	5,926
All auto	HB_STORAGE_LOCATION_1_400	95.6 %	4,992	4,77
	HB_STORAGE_LOCATION_3_000	95.2 %	3,328	3,168
	HB_STORAGE_LOCATION_3_1500	89.7 %	1,664	1,493
	HB_STORAGE_LOCATION_2,1250	92.8 %	1,664	1,544
	HB_STORAGE_LOCATION_2_750	94.4 %	1,664	1,570
	mi location occupancy by profile - highbay - nonseasonal			
	Location Profile 1	Occupied Capacity	Total Locations	Occupied Locations
92.6 %	HB_STORAGE_LOCATION_1_750	51.1 %	8,320	4,25
No-8020	HB_STORAGE_LOCATION_1_400	83.7 %	6,240	5,22
	HB_STORAGE_LOCATION_3_1000	93.4 %	4,160	3,88
	HB_STORAGE_LOCATION_3_1500	69.2 %	2,080	1,439
	HB_STORAGE_LOCATION_2,1250	92.6 %	2,080	1,92
	HB_STORAGE_LOCATION_2_750	83.4 %	2,080	1,73
	mi location occupancy by profile - highbay - seasonal			
	Location Profile \uparrow	Occupied Capacity	Total Locations	Occupied Locations
	HB_STORAGE_LOCATION_1_750	53.2 N	9,984	5,310
	HB_STORACE_LOCATION_1_400	86.9 %	7,488	6,503
59.4 %	HB_STORAGE_LOCATION_3_1000	85 %	7,488	6,36
Occupied	HB_STORAGE_LOCATION_3_1500	59.4 %	4,992	2,96

DATA-DRIVEN CONFIGURATION AND OPTIMIZATION

Grocers live and die by data and that data can play a major role in the configuration and ongoing optimization of e-grocery automation.

In the solution design stage, order profile and inventory data help ensure the solution is tailored to the specific requirements of the application. Analysis of order data also helps guide decisions about what products can be most efficiently fulfilled through automation and which should be picked manually.

Instead of using broad product categories to <u>decide what to automate</u>, the best practice is to evaluate each SKU based on criteria specific to the automation system. These criteria include the size of the product, its temperature requirements and its cubic volume velocity. Through this analysis, utilization of the automation system and picking efficiency can both be optimized.

As the process evolves advanced data analysis can be employed to project the speeds and sustained throughputs that can be expected based on historic order profiles. Automation partners with strong data analysis capabilities and proven implementation processes can even support contractual commitments to achieving target performance levels based on this analysis.

Data analysis also supports ongoing optimization of the automation system by enabling advanced slotting strategies, process optimization, and orchestration across upstream and downstream processes.



"Working closely with Swisslog data scientists gave us the confidence to move forward with our initial implementation. They were able to demonstrate, using our data, exactly how the system would perform under real-world conditions." – Kedar Patel, VP of eCommerce, H-E-B

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A CLEAR PATH FORWARD

As grocers adapt to growing e-grocery volumes and changing consumer behaviors, automated MFCs and EFCs will increasingly be required to provide the necessary productivity and speed. With the knowledge and experience available today from successful MFC and EFC implementations, they can move forward with confidence that they can achieve the performance levels and ROI they expect.

About Swisslog Logistics Automation

We shape the future of intralogistics with robotic, data-driven and flexible automated solutions that achieve exceptional value for our customers. Swisslog helps forward-thinking companies optimize the performance of their warehouses and distribution centers with future-ready automation systems and software. We are the world's leading integrator of AutoStore with more than 300 deployments worldwide, including more AutoStore deployments in e-grocery fulfillment centers than any other organization. These deployments are optimized by our SynQ automation control software, which is grocery-ready "out-of-the-box" with all the capabilities grocers need to smooth out peaks in demand, enhance inventory management and maximize system performance. Our integrated offering includes consulting, system design and implementation, and lifetime customer support in more than 50 countries.

Swisslog is a member of the KUKA Group, a leading global supplier of intelligent automation solutions with more than 14,000 employees worldwide.

For more information, contact us today.



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