



SCALABLE STORAGE AND RETRIEVAL TO MATCH WAREHOUSE PROGRESSIVE DEMANDS

OPEX[®]
INFINITY



EXECUTIVE SUMMARY

Ecommerce continues to grow exponentially and the demand for goods to move through the supply chain network at lightning speed has become the norm. A need for solutions that handle increasing volumes, adapt and upgrade existing operations, improve processes, and maintain accuracy has become a necessity for success in the warehouse.

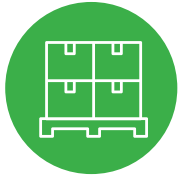
This white paper explores the 21st century warehouse and its operation in light of the growing demands placed upon it in today's business environment. This demand has created a disruption in traditional warehouse practices and is pushing operations to their breaking point. We explore the factors necessitating the move to automation and how automation should be executed to leverage current processes. We offer a solution that responds to fluctuating market demands both today and in the future, thereby maximizing the warehouse space to achieve profitability.

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CHAPTER 1

EVOLUTION OF ASRS SYSTEM



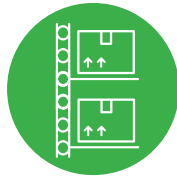
Heavy Pallets Loads



Smaller/Mini Loads



Crane-Based



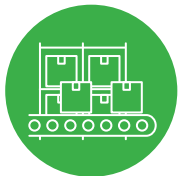
Vertical Lift Module



Cubed-Based



Goods-to-Person



Carousel

Automated Storage and Retrieval Systems (ASRS) have gone through a seemingly constant evolution since their inception dating back to the early 1960s. Originally focused on heavy pallet loads, they quickly evolved to smaller loads, also referred to as mini-loads. Mini-load systems store and retrieve totes and containers which are then transported to conveyances outside of the ASRS to be brought to another location.

By the early 1980s, ASRS systems were deployed throughout Europe, Africa, and North America. These systems provided the core benefits of reducing labor costs, improving warehouse square footage utilization, increasing security of goods, and many more. Companies looking to get a great return on investment investigated and adopted the use of ASRS systems. Over the last two decades, ASRS systems have settled into a handful of classifications, including crane-based, shuttle-based, cube-based, vertical lift modules, carousels, and now the most popular type of ASRS system – goods-to-person (G2P).

With rapidly increasing demands, the objective is now to fulfill orders within 15 minutes, whether they are for a retail consumer or for store replenishment. Meeting this benchmark requires having a system and solution with technology that has no single point of failure. This kind of precision requires an overhaul of warehouse processes, workflows, and current implemented technologies.

The system should employ decoupled picking stations which can support switching from picking to replenishing without any impact on output. Additionally, the system should incorporate lights, displays, ergonomic access to the goods for the picker, an intuitive queue of product inventory, high throughput, and scalability to match operational growth.

CHAPTER 2

21ST CENTURY STORAGE AND FULFILLMENT CHALLENGES



The evolution of retail and manufacturing organizations in the past decade warrants a close look at how the industry executes operations in its warehouses and distribution centers, as well as the delivery of products to end users. The industry is in a massive growth period where 18% of goods sales globally are done online and 38% of online shoppers will abandon their order if the delivery takes longer than a week.³ The warehouses of today must be fully optimized to address these customers' demands using technology and strategic geographic positioning to deliver and meet the market needs. If not, customers will abandon that warehouse.

18%

OF GLOBAL SALES
DONE ONLINE

38%

OF SHOPPERS ABANDON ORDERS IF
DELIVERY TIMES ARE LONGER THAN
ONE WEEK

\$12-
\$19

PER SQUARE FOOT OF
WAREHOUSE SPACE CAN IMPACT
YOUR PROFITABILITY

WAREHOUSE COST

The value of storage space isn't just capacity but is also, and perhaps more importantly, efficiency. Storage space is at a premium; warehouse square footage (sq. ft) costs range from \$12 to \$19 per sq. ft. and maximizing that footprint is paramount for profitability.⁵ The prevalence of urban warehouse facilities, also referred to as micro-fulfillment centers (MFC), is rapidly growing to allow shorter delays from order to delivery times. Due to the premium cost of urban real estate, even more thoughtful design and infrastructure placement must be exercised to strengthen the supply chain network for suppliers. The capital investment to implement and continue to operate warehouses demands a storage solution that enables them to leverage the square footage of the warehouse to its maximum benefit.

CUSTOMER EXPECTATIONS

Suppliers need to be able to efficiently store their goods and retrieve them at lightning speeds to meet their customers' ever-growing demands. Over the past couple years, this shift has made business-to-business (B2B), business-to-consumer (B2C), and direct-to-customer (DTC) transactions on a single website the new norm. Having the ability to sell wholesale, retail, and direct-to-consumer on a single site gives sellers the best of all worlds, allowing them to use a central command center to get the most out of every channel. Warehouses have therefore evolved to meet consumer expectations for fast shipping and delivery while balancing the peaks and troughs in inventory demands. 54% of consumers say delivery defines who they will always shop with.⁴ Not only are warehouse owners looking for high storage density, they also need to be able to retrieve the inventory accurately and quickly.

54%

OF CONSUMERS SAY DELIVERY
DEFINES WHO THEY ALWAYS
SHOP WITH

\$22

PER HOUR LABOR RATE
FOR WAREHOUSING AND
STORAGE EMPLOYEES

55%

NAMED LABOR SCARCITY AS
THE TOP ISSUE

LABOR SHORTAGES

Storage and retrieval are one of the most labor-intensive and expensive components of warehouse space. With labor shortages and the cost of labor averaging \$22.09 per hour for warehousing and storage employees, adoption of automation is a necessity.⁶ In a survey published by Logistics Management, 55% of respondents named labor scarcity as the top issue.¹ With the recent pandemic, labor shortages have grown astronomically. The adoption of ASRS technology has more merit today than ever before with the desire to reduce labor by 50% or more versus traditional warehouse processes. The decision is often based on a myriad of factors related to the current layout of the warehouse, including experience of warehouse designers, workflow, operation managers, and the organization's budget.

An ASRS that can adapt to existing workflows and configurations while elevating the efficiency of the warehouse is key. As operations grow, the ability of the system to scale enables resiliency in the face of labor shortages that we will inevitably continue to experience.

CHALLENGES - A DRIVE FOR INNOVATION

These new constraints and challenges have birthed a wide variety of creative robotic systems aimed at making warehouse and order fulfillment centers more efficient. Many of these use independently functioning robots which can handle small items and carry independent order bins and totes while managing complex orders that are frequently demanded by the ecommerce customers. Owners and suppliers are looking for solutions that they can use now to improve their businesses but which allow for expansion in the future as their business grows. They want a profitable solution that's turnkey and fully-integrated by one vendor to reduce coordination across multiple vendors, along with a software that is simple, yet powerful, to deliver the connectivity around the warehouse and supply chain network.

CHAPTER 3

NEXT GENERATION WAREHOUSE AUTOMATION



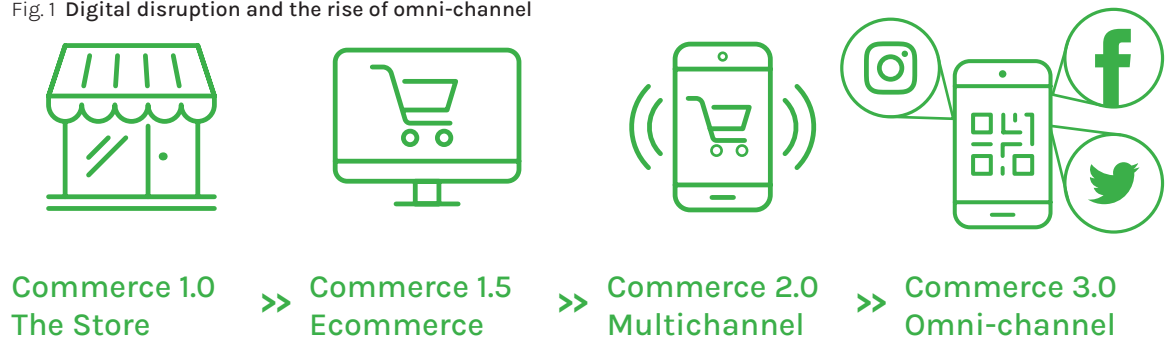
Traditionally, automated warehouses typically refer to the replacement of shelving to save floor space, improve safety, and increase productivity. Additionally, these warehouses update manual processes to ones performed by machinery and robots, thus cutting out unnecessary touches. However, in today's world automation covers much more. We are looking at the entire supply chain network from when the order is placed to when it's delivered, and controlling all the pieces of hardware to move the goods from point A to point B. The central point within this network is the warehouse or distribution center. Evaluating the steps to automation within this network is crucial.

A fully-automated facility, for example, might have a lower cost per order of under \$2.50 versus a conventional warehouse having a fully-loaded cost per order of \$3.00 to \$6.00.

BUSINESS PROCESSES

A major driving force is ecommerce growth; it's estimated that the world saw a decade of ecommerce growth all within the first quarter of 2020 alone. This has driven how we operate the processes within the warehouse. The intake of goods, storage, and fast retrieval must be designed with precision. The ASRS becomes a core component of the operation, ensuring that products are securely stored and easily retrievable to fulfill customer needs.

Fig.1 Digital disruption and the rise of omni-channel



CHAPTER 4

INTRODUCING INFINITY™



Designed and manufactured by OPEX®, the Infinity™ Automated Storage and Retrieval System combines unparalleled storage density, configurability, and flexibility with the full capabilities of the Cortex® software platform to power businesses, now and in the future. With the capability to perform up to 400 tote presentations per presentation port, per hour, and an increase in storage density up to 50%, over legacy shuttle systems, the OPEX Infinity solution is optimal for micro-fulfillment centers, store-based fulfillment, and traditional fulfillment center operations.

The Infinity goods-to-person system is highly scalable, configurable, and engineered to simplify order fulfillment while providing increased throughput and reliability. The configurable rack design allows for the system to grow in 3-in. (7.62cm) increments, starting at 9ft (2.7m) up to 32.5ft (9.9m) for maximum warehouse space utilization around obstructions or other equipment, accommodating various workflows and site layouts.



INFINITY IBOT®

The OPEX Infinity iBOTs® have access to every storage location within the entire storage grid. iBOTs are no longer contained in the system like traditional shuttle-based systems, as they can leave the storage grid and navigate on the floor, allowing them to take inventory to any remote destination. The iBOTs can carry a payload of 70 lbs., accommodating a plethora of market verticals, such as cosmetics, apparel, grocery, retail, electronics, and semi-conductors.

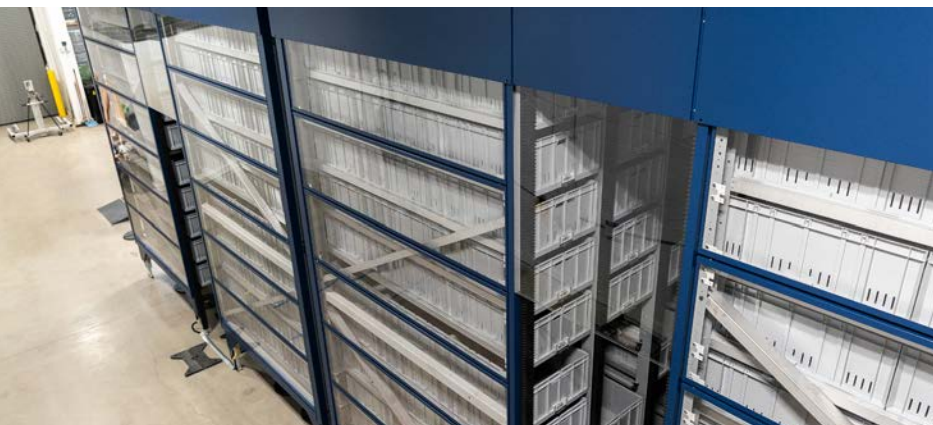
- iBOTs are powered by ultra-capacitors and operate autonomously under the rack.
- iBOTs can climb the storage rack vertically, in adjacent columns simultaneously, allow storing and retrieving to take place in parallel.
- The control system sends commands wirelessly to the iBOTs, directing them to and from the presentation ports and ordering them to recharge as needed.

CHAPTER 4



CORTEX

Cortex utilizes color-coordinated order progress indicators, a large touch screen display, and overhead illumination of the tote cell to ensure fast, simple, and accurate order picking and fulfillment.



THE RACK MODULES

A modular rack system allows for ultimate flexibility. It can be configured for single, double, or triple-deep inventory storage, eliminating any wasted space to maximize storage density. The grid can be designed to match a variety of unique building geometries, including columns.



PRESENTATION PORT

Products are delivered directly to a decoupled presentation port, providing for maximum flexibility and efficiency. Ports are available in single or dual configurations.

CHAPTER 5

CONCLUSION



Warehouses, the core of the supply chain, demand optimized solutions to help them cater to increasing customer demands and to respond to the market changes necessary for today's world. The exponential growth of ecommerce has given rise to the use of ASRS technologies optimized to work with existing infrastructure or commissioned to accommodate current needs and future expansion.

As labor shortages become more and more prevalent, increasing strain on warehouse operations, the use of automated solutions is no longer a luxury but a necessity. Infinity facilitates an omni-channel approach to delivering products to customers at lightning speed with the warehouse at the core of the supply chain network.

Fig. 2 Multiple Channels to Customer



When automating a warehouse, it's important to work with a partner that has the expertise, experience, and energy to help you realize the maximum benefits and ensure the long-term success of your warehouse.

When embarking on the journey, consider the following:



Flexibility and Configurability

The ability of the system to adapt to current infrastructure with little or no infrastructure change; configuration for current workflow with the use of decoupled workstations; automatic induction; and expansion to fit future workflows.



Scalability

The system should be able to grow with the business, having scalable storage capacity and the ability to include additional workstations to accommodate warehouse needs



Software Capability

An ASRS will need a robust software platform for optimized inventory control and easy integration with an existing warehouse control and management system.



Operator Functionality

The system should include an ergonomic design of presentation ports and an intuitive user-interface to maximize the solution's overall productivity.



Serviceability

Comprehensive service and support is needed to maintain high uptime while limiting downtime, with engineered solutions that significantly reduce failure points.

AUTHORS



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Monty McVaugh is the Manager of Warehouse Automation Product Management at OPEX where his team is responsible for ensuring the products & solutions developed meet the customer's and market needs. With eight years of warehouse automation experience, Monty enjoys working closely with customers and understanding their current challenges and applying forward thinking solutions that will solve not only today's problems, but tomorrow's as well.



DESMOND OKPEI

Product Manager, Warehouse Automation

Desmond Okpei is a Product Manager with 10 years of product experience, understanding the recipe for building and launching great products truly that solve a customer's needs.

As a Product Manager for Goods-to-Person solutions at OPEX, he is focused on understanding and contributing to the supply chain network by developing solutions that optimize warehouse operations through technology and process innovations.

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