

**ACHIEVING
FUTURE-PROOF
SCALABILITY
IN YOUR DC
OPERATIONS**

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INTRODUCTION

Today's DC operators face more challenges than ever before, especially when dealing with the growing demands of e-commerce. While automation will play an essential role in any DC that hopes to keep pace, it won't be enough merely to find solutions that serve today's needs. Growth strategies need to address current challenges as well as future operational goals.

This white paper will explore strategies for cost-effective and scalable growth that optimize and build upon existing assets, deliver rapid return on investment (ROI), and improve revenue and profit margins in the short term while providing the flexibility to adapt to future operational needs.

THE CHALLENGES

1

It's anything but "business as usual" in today's DCs. Operators are under pressure to meet new demands from e-commerce, traditional retailers and even consumers themselves. Among their key challenges include:

- **Shorter SLA windows and rising consumer expectations** — Customers increasingly want levels of service that were unheard of just a few years ago, from same-day delivery to free shipping. As a result, today's DCs sometimes have as little as four hours to process an order, but the slightest mistake risks losing that customer's business.
- **Increased system complexity** — Many DCs are still geared toward traditional retail replenishment, which typically required the management of cases or entire pallets. The rise in direct-to-consumer sales has significantly increased the number of single items or "eaches" DCs need to handle, multiplying the complexity of everything from storage and inventory management to picking and shipping.
- **More product and package variability** — The number of SKUs DCs are expected to handle has multiplied exponentially. In addition, an ever-expanding range of diverse packaging types creates challenges for automated solutions.
- **Scarce labor** — Eighty-four percent of warehouses attempting to hire new employees report there are few qualified applicants, or worse, none at all. In the U.S. alone, 600,000 warehouse jobs went unfilled in 2017. And with sustained job growth in the logistics industry expected to continue at a rate of 270,000 per year, the problem is only going to get worse.
- **Difficulty predicting change** — Customer buying patterns are in a state of flux, making future growth difficult to predict. Today, approximately 12–13 percent of all retail purchases are made online. Where they'll peak is anyone's guess. Some industry watchers predict 25 percent or higher, but no one can say how soon. The ease of placing orders on mobile phones is a significant factor in these calculations; "M-commerce" is expected to grow by nearly 50 percent per year through 2022, at least¹.
- **Order volatility** — Sales spike significantly within five peak seasons: Valentine's Day, Mother's Day, the back-to-school season, Halloween and the Christmas/Hanukkah holidays. In recent years, e-commerce has accounted for around 17 percent of all sales during these peaks, significantly more than its share over the rest of the year². Seasonal sales such as Amazon Prime Day and Asia's Singles Day are another trend creating peak shipping periods. DCs that are unable to scale up temporarily for such peaks risk missing out on a significant portion of e-commerce opportunities.



- **Space constraints** — Square footage in warehouses and DCs comes at a high cost, particularly in high-demand locations close to urban areas.
- **Returns handling** — Retailers say an average of 12 percent of all online sales are returned, and nearly half of all consumers say they've returned at least one item purchased online in the last 12 months. These numbers vary significantly by category, with apparel accounting for the highest proportion at around 43 percent. In addition, almost half of all consumers “bracket” purchases — i.e., they buy multiple items with the intention of returning some of them — at least occasionally. Many consumers now check retailer return policies before they buy, and 67 percent or more will not make a purchase if returns involve restocking or return shipping fees³. In 2020, UPS predicted that it would process 1.9 million return packages on January 2, up 29 percent from 2019⁴. While all of these factors create hassles for DCs, they also offer significant opportunities for operations that are able to make the process as effortless as possible for customers.
- **Last-mile delivery in urban areas** — The last leg of the journey is often the most difficult in urban centers, complicated both by congestion and higher costs for real estate.

Fortunately, there are answers to all of these challenges, both in greenfield and brownfield sites. Cost-effective solutions can be developed to “future-proof” your DC, ensuring scalable growth among three strategies:

1. Optimization of existing assets
2. A connected infrastructure that leverages data
3. Advanced automation of warehouse equipment, including robotics, system integration and flexible software



KEY COMPONENTS OF A FUTURE-PROOF, SCALABLE DC

2

Every DC has its own unique challenges, product mixes and customer requirements. As a result, no single solution will meet the needs of every operation. The ideal approach to creating a future-proof DC is to work with an experienced partner who understands both the challenges of material handling and the variety of solutions that can address your current and future needs. Optimum results are best achieved by combining existing assets with one or more of the following technologies.

AS/RS SOLUTIONS

Cube or shuttle-based automated storage and retrieval systems (AS/RS) provide a strong foundation for a future-proof DC. In addition to maximizing throughput and improving the efficiency of shipping and receiving functions, AS/RS offer high storage density in a reduced footprint and easy, flexible scalability. While these are obvious benefits in any DC, they're particularly important for urban core micro-fulfillment centers, where every square foot comes at a premium cost.

Multiple racking and shuttle configurations are available to ensure that sites make the most efficient use of every inch of available space, from one-level shuttle systems to high-volume buffer shuttle solutions. When properly deployed, AS/RS integrates seamlessly with other systems and processes, including human labor, picking technologies, conveyors, automated sortation and robotics.

Common AS/RS DC applications include:

- Goods-to-operator or goods-to-robot order fulfillment
- Mixed-load, full-case and break-pack order fulfillment
- Product sequencing and buffering
- Route-based delivery sequencing
- Returns processing
- Temporary storage
- Auto-replenishment of pick modules



AS/RS also gives DC operators more flexibility when making decisions about the management of scarce labor. For example, you can choose to maintain your current throughput while reducing space and labor needs, or leverage current assets to significantly increase the number of SKUs and orders handled by your operation (see below for more details).

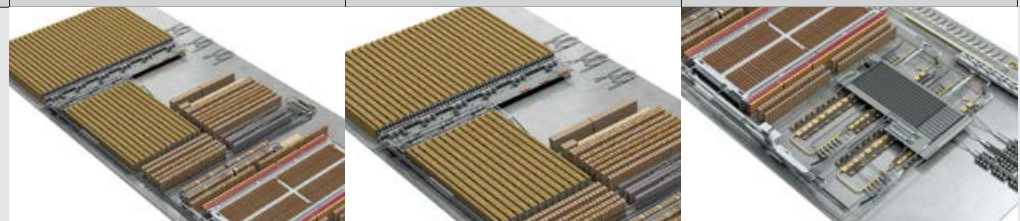
BROWNFIELD RETROFIT COMPARISON

This hypothetical example shows two ways an AS/RS can enhance the current assets of an existing distribution center.

- **Option 1** cuts the full-time employment (FTE) count in half, while reducing needed space to $\frac{2}{3}$ the size of the existing system.
- **Option 2** doubles both the number of SKUs the site is able to manage and the number of orders processed each day – without the need for additional labor or space.

In either scenario, ROI is achieved in less than three years, outcomes improve, and cash flow becomes more predictable.

	Existing System	Option 1 Reduce Labor/Space	Option 2 Add SKUs/Orders
SKUs in Inventory	100,000	100,000	200,000 ↘
Orders per Day	75,000	75,000	150,000 ↘
FTE Count	700	350 ↘	700
Required DC Footprint	750,000	500,000 ↘	750,000
ROI	—	< 3 Yrs	< 3 Yrs



ROBOTIC TECHNOLOGIES

While the industry still may be years away from a fully autonomous robotic fulfillment facility, recent technology advancements are already addressing some of the greatest challenges faced by DC operators. Robotic solutions are now capable of replacing the most undesirable jobs and providing throughput well beyond human capabilities.

These developments are timely in today's increasingly tight labor market. Instead of replacing humans, robots are enabling scarce workers to be reallocated into more desirable and higher-value jobs. This trend benefits workers and employers alike, reducing absenteeism and injuries while increasing worker satisfaction and productivity.

Today's robots provide flexible, scalable options for a variety of applications, including:

- **Loading and unloading** – autonomously loading and unloading trailers with minimal operator supervision or intervention
- **Sorter induction** – automating induction of boxes, polybags and jiffy bags, increasing volume and accuracy while improving efficiency of downstream sortation systems
- **Each picking** – identifying, picking and placing individual items



- **Mobile robotics** — transporting loads, handling carts, and performing RFID scans with autonomous roving vehicles
- **Palletizing** — efficiently building stable pallet loads according to operational requirements
- **Depalletizing** — quickly unloading full layers or individual products from pallets
- **Case packing and unpacking** — singulating or packing products in preparation for downstream processes

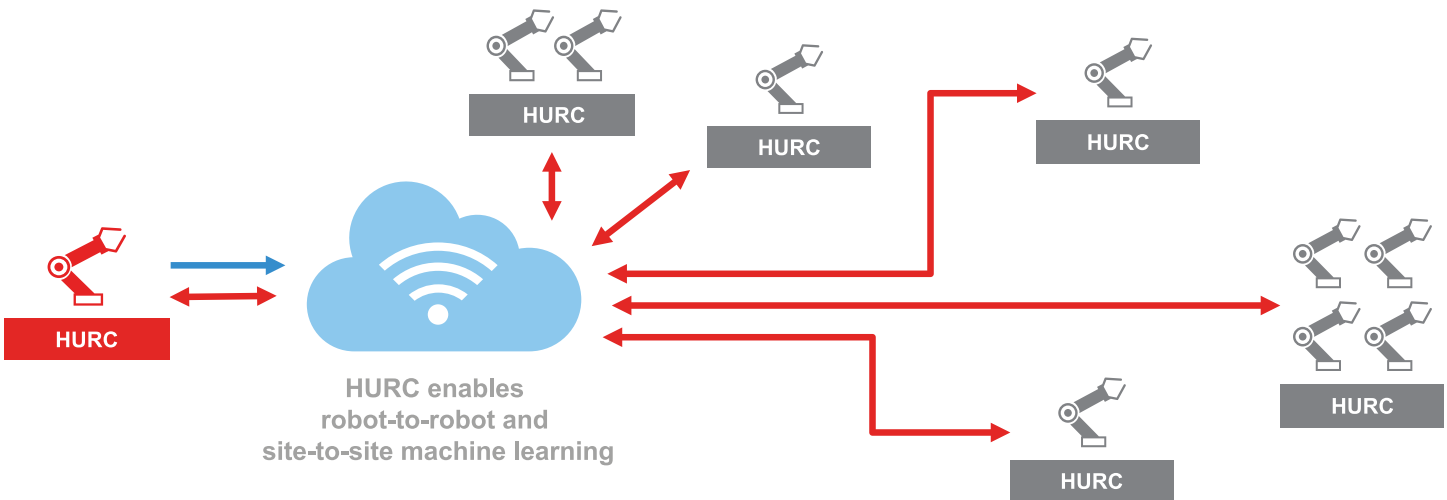
In addition, robotic technologies can adapt quickly to changes in current and future needs. They can be activated or deactivated as needed to supplement human labor during peak seasons, minimizing overscheduling and overstaffing. Unlike conveyors, which are bolted down and costly to reconfigure, robots can be quickly reprogrammed for new routes and tasks, and can even respond to the constant changes of today’s DCs on their own.



UNIVERSAL ROBOTICS CONTROL

To facilitate greater robotic integration in DCs, Honeywell Robotics began implementing a universal control platform in 2019: the Honeywell Universal Robotics Controller (HURC). Developed in collaboration with Carnegie Mellon University, HURC is designed to enable faster implementation and meaningful performance advantages with fewer operator interventions.

With HURC, the perception and intelligence developed for one type of robot can be leveraged into other robot types. Once a single robot learns the solution to a new problem, its training model can be pushed out to every robot performing that application across all of a user’s sites. The platform also provides sophisticated reporting, diagnostics, notifications and alerts — across your DC and between sites — to identify challenges and prevent problems before they occur.



VOICE TECHNOLOGIES

Voice solutions provide an intuitive way to connect people to automated systems, and bridge the gap between humans and robots. They enable automated, hands-free order fulfillment with proven and measurable benefits, including order accuracy rates of more than 99.9 percent and productivity improvements of up to 45 percent.

Labor flexibility is enhanced by the several benefits voice systems provide. For example, training and facility improvements can be accelerated with live remote coaching. Voice also enables quick ramp-ups of part-time and temporary employees.

Voice technologies can be deployed quickly into existing processes without causing disruption. Their ease of use ensures rapid user acceptance and site adoption while delivering fast ROI. Voice blends seamlessly with other automation technologies, automating highly complex mobile tasks and workflows and adapting quickly to ever-changing fulfillment requirements. Once in place, they are expanded easily between facilities and across multiple processes.



CONNECTED INFRASTRUCTURE

With the proliferation of automation solutions designed to perform very specific tasks, operators often struggle to connect disparate systems and coordinate the entire warehouse. Connecting these islands of automation allows different workflows to be integrated, enables end-to-end control, minimizes bottlenecks, and provides real-time visibility for decision-making, prioritization and execution.

Even the most complex and chaotic DC environment can operate more smoothly with an overarching, flexible system. In addition to coordinating all your assets, a connected infrastructure can leverage data analysis, artificial intelligence (AI) and machine learning to provide predictive analytics and other insights to enhance your operation's decision-making. It also provides a baseline for benchmarking performance, either against other operations or within your own network.

Data analysis quickly pays for itself by eliminating unplanned downtime. This significantly reduces your costs for overtime, reallocated and idle workers, shipping and truck expenses, and more. A connected infrastructure also can detect equipment degradation and process inefficiencies to help you identify fault conditions that could limit productivity or threaten uptime. By tapping into sensors and PLC data, you can:

- Receive real-time notifications of issues affecting an asset or process
- Uncover hidden areas of utilization
- View current system status and historical data trends for accurate forecasting
- Preempt and predict unplanned downtime



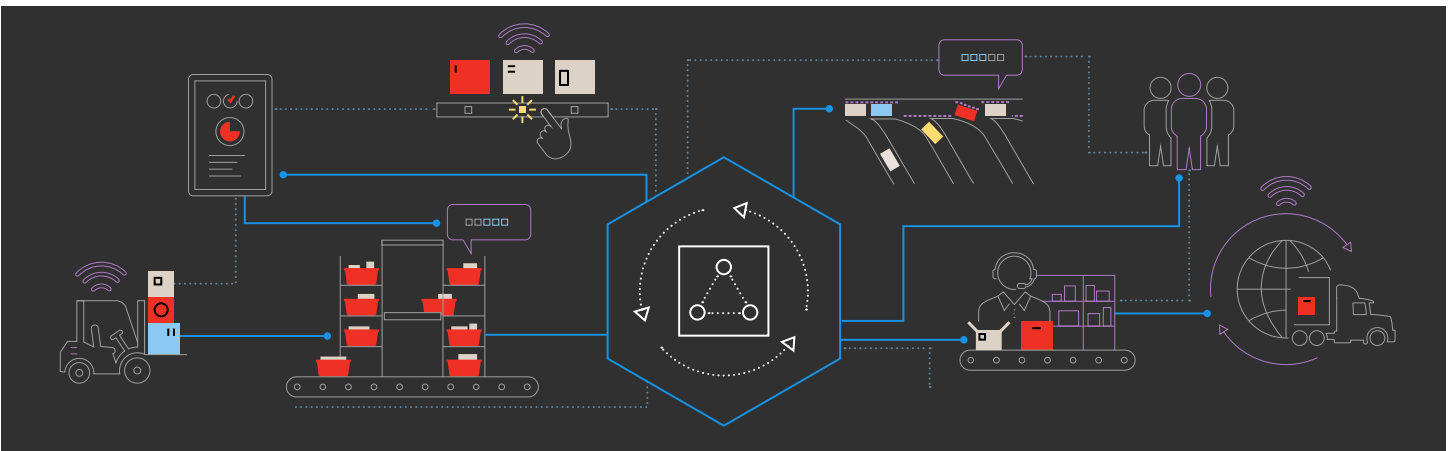
WES FUNCTIONALITY

An integrated software suite with warehouse execution system (WES) functionality provides an attractive alternative to the usual patchwork of multiple vendors, separate controls and stranded islands of automation. The advantages of this approach include enhanced workflow and process integrity; maximum uptime of equipment and automation; and customizable WES functionality that can adapt and grow with your requirements.

One of the benefits of such a suite is enhanced inventory management, driven by AI for just-in-time allocation and order consolidation. Demand is allocated based on real-time put wall availability data to:

- Increase throughput while decreasing congestion
- Coordinate order picking with put wall station availability
- Combine the benefits of wave picking with just-in-time location allocation

Connected DCs also can maximize the storage capacity of AS/RS by dynamically matching product size and shape attributes to available locations. This increases storage density and capacity within your existing footprint, accommodating variable SKU sizes without the need to change the square footage of your site.



SIMULATION TECHNOLOGY

Physics-based simulation technologies offer extremely accurate projections of performance before implementation, providing significant value throughout the progression of any automation project. Early on, they can demonstrate prototypes and system operation. And as the design plan comes together, it can be validated and refined by analyzing operation, improving the layout and product flow.

Simulations can identify where robots will provide the greatest benefit and show where conveyors, storage systems or other solutions might be most effective, without having to rely on trial and error with physical components. You also can calculate how many people automation will free up for safer and higher-value jobs.

At the final stage, simulation technology allows you to create a fully functional digital twin of your design, including machines, motors, sensors, valves and more. This design can be emulated and tested with the same control logic that will run the actual hardware, enabling scenario-based testing and response planning while saving you time and money at the physical commissioning stage.

CONCLUSION

The material handling and automation experts at Honeywell Intelligrated offer you a breadth of experience, products and solutions to help you build a truly future-proof, scalable DC. Instead of force-fitting specific products to address your unique challenges, you'll get the benefit of extensive systems expertise and product portfolios designed to deliver optimum results for your current and future fulfillment needs.

We can help you achieve your goals with expert assessments, data analyses, designs, simulations and operational consulting. These resources will enable you to create cost-effective solutions that optimize your existing DC assets, create a connected technology infrastructure, and expand on this foundation with advanced warehouse tools, system integration and flexible software that seamlessly scale with your evolving business requirements.



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AFSWP (EN/US) | 02/21

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