THE BUSINESS CASE FOR ROBOTICS IN DISTRIBUTION CENTERS

Market Forces and New Technologies Give Automated DCs the Edge

Honeywell Intelligrated®

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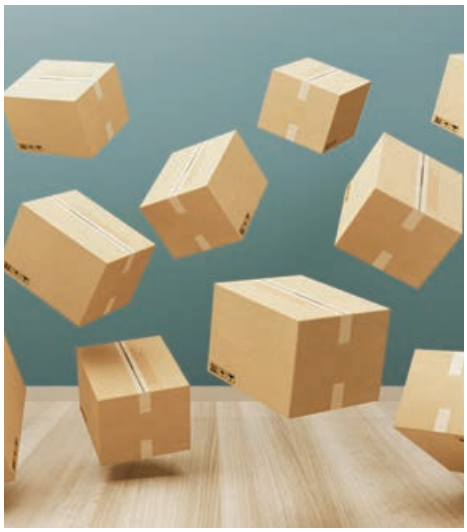
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SUMMARY

The volume of e-commerce keeps growing. Associated distribution demands were already accelerating at a rate of 25% before the outbreak of the COVID-19 pandemic, which saw spikes in consumer e-commerce sales of more than 50%. Meeting e-commerce demands is a challenge — with more than 80% of distribution centers (DCs) operating manually yet drawing from a very limited labor pool.



Just how serious is the labor shortage? Industry growth outpaces that of the labor pool by a rate of six to one, making the DC a prime environment for robotics. But deployment is limited. Why is that?

The dynamic, unstructured environments of distribution centers differ greatly from the manufacturing facilities where robotics have historically thrived. E-commerce means distribution centers are characterized by intense growth, high product variability and above all, change. This poses a multi-faceted challenge to robots, putting their work in DCs at odds with the predictable, repetitive tasks of manufacturing environments. From variable package types and sizes to new items and seasonal surges, robots must be able to adapt and improve over time — with minimal manual intervention.

The chaotic logistics environment that followed the outbreak of COVID-19 demonstrated the vulnerability of DCs that were slow to embrace automation prior to the first quarter of 2020. By contrast, forward-looking DCs that already had automation solutions in place were able to scale faster and respond to sudden market changes with greater flexibility. They were also able to make the best possible use of available human labor, shifting workers where they were most needed and maintaining higher productivity than competitors — even as the virus intensified existing worker shortages.

Even as the virus recedes, many e-commerce trends have been accelerated. These developments are already highlighting the entire industry's need to take a much more serious look at automation and consider an expanded use of robotics, not to replace human workers, but to remain competitive in response to unprecedented market changes.

Fortunately, today's logistics automation solutions are evolving faster than ever. A confluence of innovative technologies is not only enabling unprecedented capability and performance, but making such systems significantly more integrated and cost-efficient than in the past.

When these exciting developments are coupled with an end-to-end understanding of the specific challenges faced by modern DCs, the results can be truly remarkable. Consideration of the entire operation — not just specific tasks — is already enabling unprecedented levels of optimization, workplace safety and productivity.

STARTING POINT: THE MANUAL DC

In a surprising number of today's distribution centers — around 80% — many of the most common tasks are still handled manually by human labor, including:

- Picking
- Packing
- Load transportation
- Unloading freight
- Replenishment
- Sorter induction
- Palletizing and depalletizing
- Secondary singulation
- Sortation

What makes humans so well-suited to handle these tasks? There are two key factors:

The first is the human brain itself. We humans have a remarkable ability to perceive our surroundings with all five senses, especially sight and sound. Humans have the cognitive abilities to understand and react quickly to changes in our environments. And while robots must be programmed with sophisticated algorithms to ensure efficient motion planning — i.e., getting from one location to another, maintaining balance, avoiding obstacles and the like — humans can navigate chaotic places like distribution centers seemingly without effort.

A second advantage is our ability to grip objects. Humans instinctively adjust the amount of grasping power they use to match the item they're handling. In this way, we don't crush or cause damage to merchandise, even if it's fragile. At the same time human workers are strong enough to move heavier items. In addition, tactile feedback allows us to make adjustments on the fly, often without looking at the item we're handling.

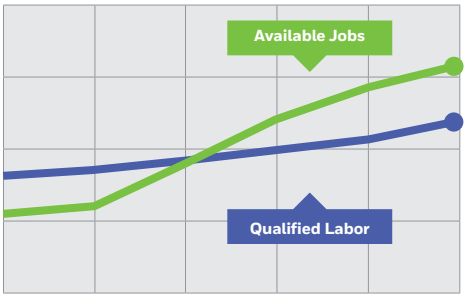
Yet despite our mental and physical advantages, humans aren't always the best choice for common DC tasks, which can be repetitive, tedious and even injury-prone. Some jobs, like loading and unloading freight, are often performed in uncomfortable conditions, especially during seasonally hot or cold weather. Productivity and safety can suffer when humans get bored or distracted. In addition, recent demographic challenges and explosive growth in the fulfillment industry are driving demand for alternative approaches.



SCARCE LABOR HOLDS MANY DCS BACK

1

Labor remains the most significant challenge for today's DCs. Even though the amount of available jobs is growing, the pool of qualified candidates isn't keeping pace.



Today's labor shortage was predicted almost a decade ago, partly because of a long-expected trend of baby boomer retirement. Roughly 10,000 baby boomers have reached the traditional retirement age of 65 *every day* since 2011, but there are fewer younger workers available to replace them. Both trends are set to continue for more than a decade.

In many parts of America, the unemployment rate had reached its lowest point in 50 years before COVID-19. Eighty-four percent of warehouses attempting to hire new employees reported few qualified applicants, or worse, none at all. In the U.S. alone, 600,000 warehouse jobs went unfilled in 2017. Even before the pandemic dramatically increased demand for workers, sustained job growth in the logistics industry was already on track to continue at a rate of 270,000 per year. By 2022, the available labor force in the United States shrank by an estimated 2% compared to pre-pandemic levels, and the problem is only going to get worse. DCs that want to remain competitive will need to act quickly.

While many companies weren't prepared to lose so many workers this quickly, the sheer number of retirees and workers lost to COVID-19 are only part of the problem. They're leaving behind a significant gap in both basic and applied skills, from vocational training to "tribal" knowledge traditionally learned on the job. There's also a sense among some employers that newer workers lack the professionalism and stronger work ethic of their departing peers. As employers lower standards to attract more workers, a higher percentage of those workers become less reliable. It's not unusual, for example, for a worker to walk out at lunch and go down the street for an extra 25 cents an hour. There are new challenges to deal with as well, such as a rise in the number of warehouse workers who don't speak English as their primary language.

Employers are casting a wider net to help stop the gap, such as turning to vocational



training centers for the disabled. Even with these creative initiatives, however, many positions remain vacant.

No matter where workers can be found, demand and other factors are driving up the cost of warehouse labor. From January 2020 to September 2021, the average hourly wage of warehouse and logistics employees rose by nearly 10%, some of the fastest wage growth since data began being collected.

High turnover rates — which skyrocketed to 46.1% for warehouse workers in 2021 — add even more costs. Replacement costs per worker can run from 25–150% of an employee's salary, depending on which factors you include in the calculation. Costs that are more difficult to measure include a lack of continuity, covering for open positions and lost productivity.

DCs are also at risk if they don't have enough labor to meet service-level agreements (SLAs) with their customers. This can lead to costly fines, chargebacks and lost contracts, or even prevent an operation from performing basic business functions. Some employers have attempted to deal with these risks by consistently overstaffing, then sending workers home when they're not needed. This strategy often has negative long-term impacts as frustrated workers look elsewhere for jobs that provide more reliable paychecks, triggering higher replacement and retraining costs.

And all these costs are adding up in a market that's under more pressure to *reduce* costs than ever before.



MAXIMIZING PRODUCTIVITY

2

The runaway success of e-commerce has trained consumers to shop online for the lowest price, literally down to the penny. At the same time, the COVID-19 pandemic has encouraged more consumers than ever to seek e-commerce suppliers for everything from groceries to prescription drugs.



As a result, practically the entire retail industry has been commoditized by empowering consumers with one-click comparison shopping. At the same time, e-commerce customers expect high service levels at little or no cost, including fast (and free) shipping and free returns. Yet even as direct shipments to consumers rise at the expense of bulk distribution to brick-and-mortar retail stores, many shippers have responded by shifting to more costly pricing structures like dimensional weight (DIM).

While traditional retail has had notoriously low margins (in the low single digits) for some time, e-commerce is typically even less profitable.

ROBOTS TO THE RESCUE

While some people worry about robots taking their jobs, the fact remains that there are many more unfilled distribution center jobs than qualified workers, a trend which will get worse before it gets better. Automating repetitive and physically demanding jobs creates a win for everyone. Smart robots can take on tasks that typically have high turnover, allowing you to shift scarce labor to more satisfying and higher-value jobs.

Automation has traditionally been easier to implement in environments that are controlled and structured, such as manufacturing. Robot performance is easy to optimize in these conditions because they work with limited SKUs that have carefully defined weights, shapes and sizes.

Distribution environments are a lot more chaotic because everything is constantly moving and changing. Robots that work in this industry must handle the wide variety of shapes, weights, sizes and types of products seen in this environment, which means they need to see better, think smarter, and act faster than ever before.

In the past, high costs or complexity have held many DCs back from implementing automation. Today, however, two encouraging developments are changing the game.

First, costs are coming down. The average price of industrial robots has been falling steadily for more than a decade, and the trend looks set to continue through at least 2025.

Second, DC automation is finally coming of age, thanks to these key technologies:

- **Sensors and computer vision —** Today's robots are more aware of their environments, have an improved improved sense of touch/gripping, and can handle the most delicate objects with greater care.
- **Mobility —** Mobile robots can navigate ever-changing DC environments, avoiding obstacles, people and equipment with little or no additional infrastructure.
- **Computing power —** Today's robots have the robust speed needed to perform more reliably in environments like DCs.
- **Machine learning and AI —** Enable advanced problem solving, including the ability to learn from experience and even from other robots.
- **Simulation —** Allows you to identify where robots will provide the greatest benefit before you commit to a capital purchase.
- **Connectivity —** Offers significant performance advantages with fewer operator interventions, plus the ability to identify performance-enhancing improvements over time.

ROBOTS MEAN BUSINESS

All of these advances, combined with Honeywell Intelligrated's expertise in logistics, distribution and materials handling, are ensuring that you can implement the latest advances in DC automation with minimal cost and technical risk — whether you need a stand-alone or a complete end-to-end solution.

For more information, download the related white paper, Breakthrough Robotics Empowering Distribution Centers, or contact Honeywell Intelligrated.



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