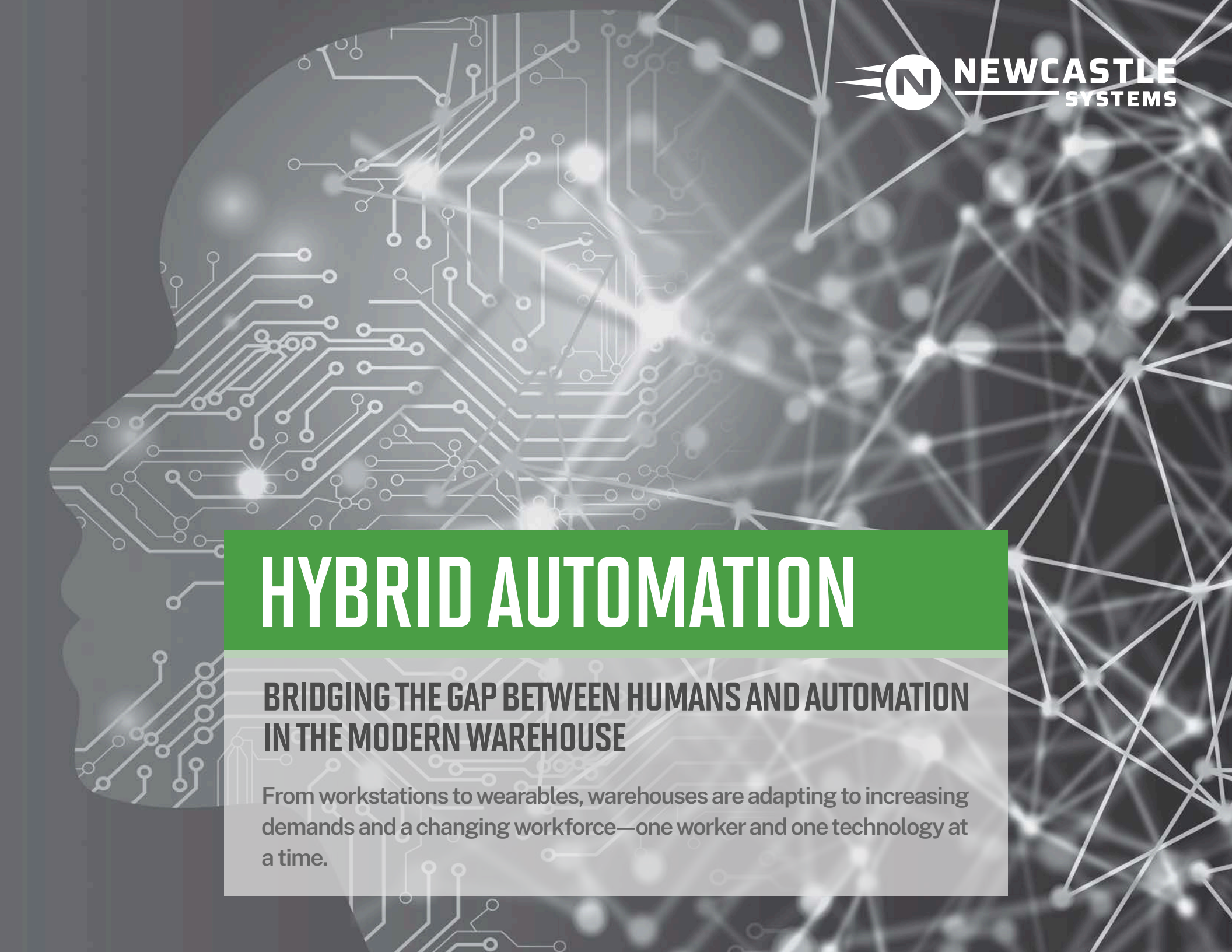

NEWCASTLE SYSTEMS

HYBRID AUTOMATION

BRIDGING THE GAP BETWEEN HUMANS AND AUTOMATION IN THE MODERN WAREHOUSE

From workstations to wearables, warehouses are adapting to increasing demands and a changing workforce—one worker and one technology at a time.

ROBOTS ARE NOT TAKING JOBS, BUT THINGS ARE SET TO CHANGE

The introduction of automation has revolutionized the landscape of modern warehouses, fundamentally altering how they operate and **reshaping the role of human workers**. This shift brings forth a multitude of opportunities and challenges as businesses seek to optimize warehouse efficiency to stay competitive in a rapidly evolving market.

As machines and technology increasingly take on routine tasks, human workers find themselves collaborating with these intelligent systems, requiring new skills and adaptability to navigate the changing dynamics of warehouse operations. In this interplay between automation and human labor, **creating the right balance** is crucial to unlocking the full potential of a highly efficient and seamlessly integrated warehouse ecosystem.

This report explores the transformative impact of automation, the evolving role of human workers on-site, and the critical imperative of achieving optimal warehouse efficiency in the digital age.

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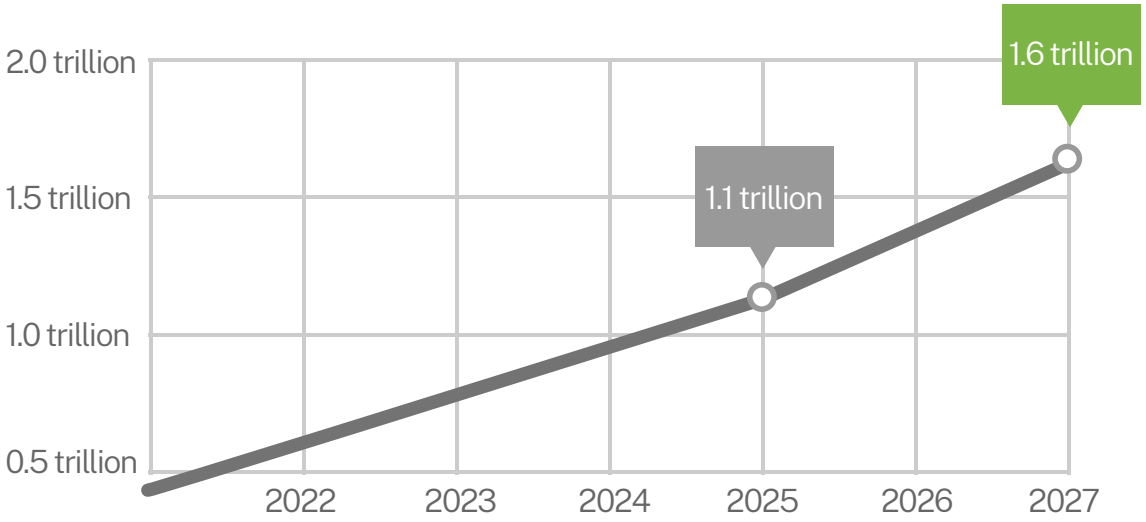

Ecommerce Orders

Online sales in the U.S. are anticipated to reach **$1.1 trillion** by 2025, and exceed **$1.6 trillion** by 2027.

Keeping Up With an Automated Future

In the age of automation and ever-changing worksites, modern warehouses must adapt to integrate dynamic automated systems effectively and contend with evolving roles of human workers.

In pursuit of enhanced throughput, efficiency, accuracy, and adaptability, numerous companies are integrating automation into warehouse operations. Surges in ecommerce orders—online sales in the U.S. are anticipated to reach **$1.1 trillion** by 2025, and exceed **$1.6 trillion** by 2027 according to Forrester Research—coupled with a widespread labor shortage—the National Association of Manufacturers reports that more than two million manufacturing jobs could go unfilled by 2030—has further accelerated this trend as organizations strive to swiftly adapt to fluctuations in demand and customer preferences.

Although robotics and automation are becoming more relevant in warehouses across the globe, workers are still essential resources in these workplaces. Automation assists human workers to become more productive and efficient.

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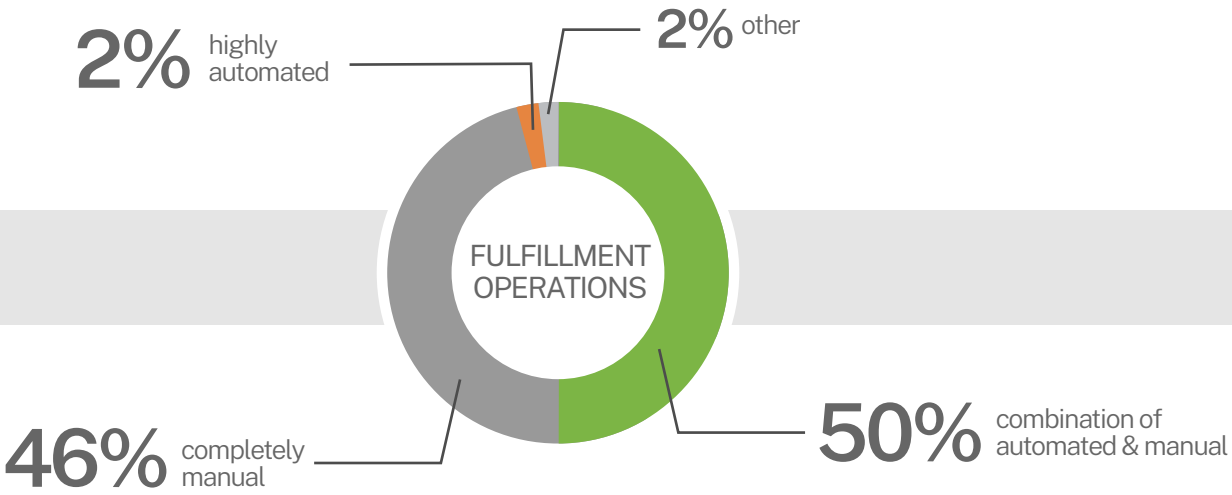
Manual vs. Automated Fulfillment Operations

According to a recent survey conducted by **Newcastle Systems**, 50% of companies are running fulfillment operations that include a combination of automated and manual processes. Forty-six percent say that most or all fulfillment processes are completely manual, and **only 2% say they have "highly automated" fulfillment operations**.



In short, these companies are creating warehouses which rely on **hybrid automation**—a pragmatic blend of automated processes of different tools and resources allowing workers to be as efficient as possible. From untethered workstations that flow with workers movements to wearable devices that augment their workday to scanners, eyeglasses, exoskeleton suits and cobots in manufacturing, companies are creating customized hybrid solutions designed to work for their environment and workforce.

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What Makes a Great Hybrid Warehouse?

A great hybrid warehouse is characterized by its ability to effectively combine the advantages of automation and human labor, leveraging technology and skilled workers to optimize operations. Several key elements contribute to making a hybrid warehouse including flexibility and scalability, efficient automation integration, a skilled workforce, and the ability to adapt to changing technology.

By integrating several of these elements, a great hybrid warehouse can achieve enhanced efficiency, reduced operational costs, and improved customer satisfaction, providing a competitive advantage in a rapidly evolving business landscape.

Enhanced efficiency

Reduced operational costs

Improved customer satisfaction

Inefficiency Within a Warehouse

Inefficiency within a warehouse can lead to **significant losses in both time and revenue**. Surprisingly, the average warehouse worker remains largely unaware of the extent of time wasted in their daily operations. This lack of awareness compounds the costs, including both material and fiscal aspects, associated with inefficiency. To optimize warehouse performance and mitigate these losses, it is crucial to address inefficiencies proactively, improve worker awareness, and implement streamlined processes and technologies to enhance overall productivity and profitability.

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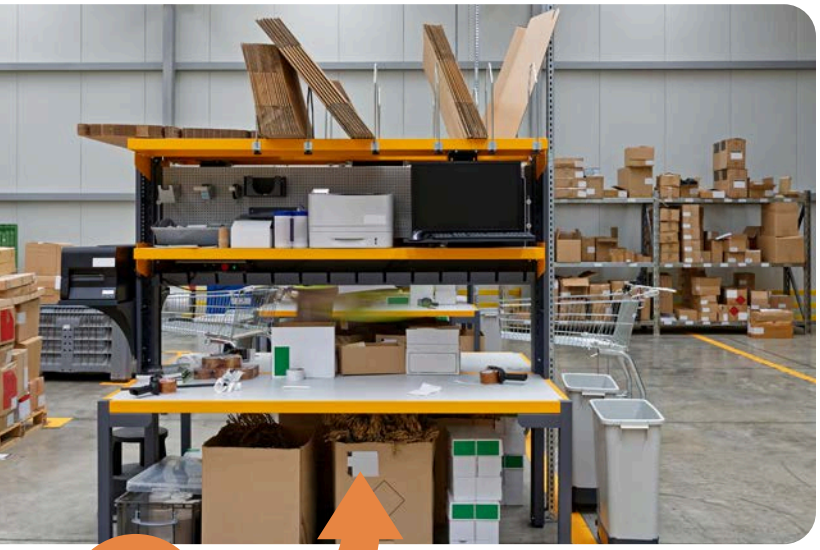

Out With the Old, In With the New

Tethered connections are considered old school and inherently dangerous in today's rapidly advancing technological landscape. These connections, which require physical cables to link devices, limit mobility and flexibility in a world that values seamless integration and convenience. Tethered connections pose potential dangers, such as tripping hazards and cable entanglements, which can lead to accidents and injuries within a warehouse. In industrial settings, cables may be exposed to harsh conditions, risking damage, and compromising safety.

As modern technology continues to evolve, the adoption of wireless and more secure communication methods has become the norm, reducing the reliance on tethered connections, and promoting a safer and more efficient digital ecosystem.

Incorporating "Lean Technology"

Lean technology helps employees move products more efficiently, ergonomically, and safely—all of which add up to increased productivity, employee satisfaction, faster fulfillment, and reduced costs.

"Lean labeling" refers to an approach to the labeling processes within warehouses and distribution centers that focuses on streamlining, a question of "the right label" or not, but "the right labeling solution" which means getting the right printer, ribbon, and label combination.

Technologies Helping Companies Embrace Hybrid Automation:

1. Mobile workstations

The traditional computer workstation in a warehouse is tethered to a particular location where the monitor, computer, and printer sit. This is an outdated, tedious setup which wastes time as workers are constantly moving to and from it in the warehouse. So, rather than making the worker walk to and from the workstation, more companies are bringing the workstation to the worker. **Newcastle Systems mobile computer workstations** eliminate wasted time by providing everything workers need to stay on task—effectively doubling the productivity and throughput for each and every worker.

Newcastle Systems NB Series Workstation with PowerSwap Nucleus® Lithium Power System

Newcastle Systems' unrivaled lineup of solutions have made the company the go-to source for mobile productivity solutions. The carts offer mobility and flexible configurations which can transform any process and create measurable efficiencies for supply chain operations.

The proof is in the numbers: The company's solutions produce significant benefits for companies of all sizes. In fact, the top reasons warehouse managers say they embrace Newcastle Systems' mobile power cart solutions are:

92% FEWER ERRORS

When workers input, print and apply labels at the dock, you'll be able to kiss all of those pricey mistakes goodbye.

2X PRODUCTIVITY

Twice the productivity without having to add employees during a labor crunch. Get the most from every valuable employee and give them higher job satisfaction in return.

QUICK PAYBACK

The company's systems offer a predictable 6-10 month return on investment (ROI), followed by many years of additional benefits and "wins."

TRIMMED PAYROLL

Higher throughput in fewer hours; cut payroll and overtime.

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Wearables also offer other benefits that improve worker well-being. In a case study, Gap Inc. Director of Distribution Engineering noted someof the positive impacts of implementing ProGlove Smart Gloves into their workflow:

- The form factor of the ProGlove scanner eliminates excess motion and a lighter weight design is more comfortable for operators to use
- Ergonomics and ease of use reduce fatigue and improve quality
- By minimizing focus on the tool, ProGlove scanners allow associates to concentrate more fully on their operational tasks

2. Wearable devices

Six billion barcodes are scanned every single day—practically one bar code for every human. And yet, until recently, these were scanned using tools like a scanning gun that people hold in their hands to operate.

Enter wearable solutions. One startup, **ProGlove**, has made a name for itself as the industrial barcode scanner. Over the last six years, the company has grown from an idea of a founder looking to make scanning more efficient for automotive manufacturers to a global company working with major companies to help workers save 3-4 seconds for every scan. Those numbers add up, especially in high-scan environments where workers may be making hundreds if not thousands of scans per day per employee.

Other wearable tools like smart glasses offer employees additional enhancements throughout their workday, augmenting the human worker. Take **Vuzix's Smart Glasses**. The glasses are both a means to protect and make workers more efficient. Vuzix Blade® smart glasses are dubbed as the "first self-contained Augmented Reality (AR) smart glasses featuring advanced waveguide optics for hands-free mobile computing and connectivity."

Eyes are protected and workers can maintain focus on their work. The see-through waveguide optics merge digital instructions onto real-world tasks, which aims to remove distractions and vision occlusion while reducing error rates.

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3. Exoskeleton tools

In the realm of biology, exoskeletons serve the purpose of providing support and safeguarding an animal's body. Similarly, industrial exoskeletons have a comparable function. According to EHS Daily Advisor, these are external devices designed to **enhance, amplify, or reinforce** the performance of an employee's existing functions.

Two primary categories of exoskeletons exist: active and passive. Active exoskeletons are driven by mechanisms like electric motors, pneumatics, hydraulics, or a blend of these technologies, often referred to as "robotic exoskeletons." Passive exoskeletons operate based on the natural movements of the human body and utilize springs and counterbalancing forces. They offer support for the back, shoulders, arms, and legs, and can even assist with holding tools.

The primary aim of wearable industrial exoskeletons is once again to **augment human performance**. This technology holds the potential to contribute positively to the reduction of work-related musculoskeletal disorders (MSDs) that arise from tasks like lifting and handling heavy materials, or supporting weighty tools during overhead work. Exo-skeleton devices are being introduced and tested in various industry sectors, including car and aircraft manufacturing, construction, wholesale, and retail trades.

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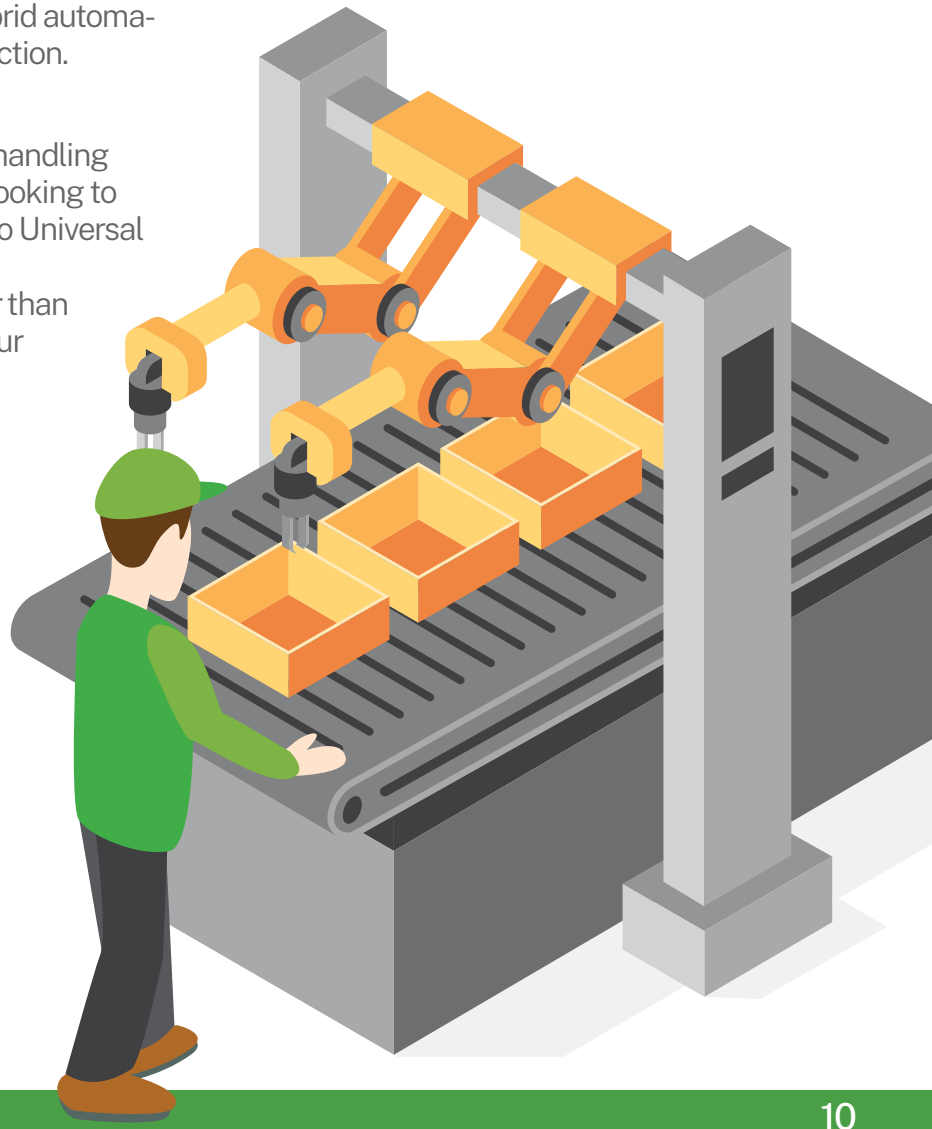
4. Cobots in the warehouse

Many people fear that soon industrial spaces will be void of human workers and exclusively filled with automated systems. That is why complex robotic systems working in tandem with human counterparts may be the epitome of hybrid automation, because the human element remains vital and necessary for production.

Collaborative robots, or cobots, are gaining momentum in the material handling and industrial spaces because they offer a great balance to operations looking to modernize without eliminating any roles of human workers. According to Universal Robots (UR), a primary supplier of cobots in North America, "Cobots are designed to share a workspace with humans, making automation easier than ever before for businesses of all sizes. All of these benefits have made our cobots a game-changer for a wide variety of applications."

Systems such as Kuka's "Arc Welding Robots" or Boston Dynamic's "Stretch Arm" are helping alleviate much of the physically demanding tasks warehouse workers endure and allowing them to focus their work on more pressing priorities. Universal Robots (UR) has sold tens of thousands of cobots to production environments around the world that help companies address market volatility. UR's cobot solutions provide flexibility and financial return that manufacturers need to remain competitive and adaptable to the changing marketplace.



Looking to the Future

Modern warehouses need to stay updated on the latest technology to optimize efficiency and match the recent innovative trend of the industry. Without it, the full potential for maximized time and throughput will not be achieved, thus, less revenue growth.

As an example, Newcastle Systems recognized a widespread problem within warehouses and set out to be the best possible solution for companies. Mobile power workstations provide integrated power on the cart and are designed to make industrial barcode printers, scanners, and computers as an ergonomic productivity tool to physically take the needed element to the work, in most cases, allow for on-demand label printing.

Companies like the ones referenced in this report and others are helping workers stay efficient and embrace technology. This is propelling industrial environments toward a future full of hybrid automation within warehouses, elevating operations to unprecedented levels while effectively bridging the interaction between humans and machine capabilities.

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SAVE STEPS. INCREASE PRODUCTIVITY.™

Report author: Newcastle Systems

In 2005, Newcastle Systems, Inc. was the first U.S. company to introduce mobile powered industrial carts to support supply chain applications, bringing leading-edge efficiencies to the market. The company has continuously pioneered new technology developing the first swappable lithium battery system for industrial applications in 2016, as well as the most ergonomic mobile carts available. A privately-owned, Massachusetts-based company, Newcastle Systems serves some of the largest retailers, manufacturers and distributors in the world to help to increase supply chain efficiency by consistently doubling employee productivity while reducing costly labeling errors by over 92 percent.

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