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THE DEFINITIVE GUIDE TO
WAREHOUSE AUTOMATION

The Fourth Industrial Revolution — also called Industry 4.0 — has arrived. While the first Industrial Revolution enabled mechanized production, the second empowered mass production, and the third allowed automation, Forbes notes that Industry 4.0 bridges the gap between digital and physical systems, "with the intent of taking the automation process to an entirely new level."

For warehouses, this next generation of automation offers multiple benefits, including streamlined production and picking processes that both reduce error rates and improve operational outcomes. According to Supply and Demand Chain Executive, evolving industry demand is also driving automation adoption: 91 percent of companies now experience challenges finding and hiring warehouse workers with the right skills. Plus, physical risks to staff are on the rise as warehouses expand both outward and upward to accommodate larger inventories and on-demand shipping solutions.

It's one thing for warehouse operators to recognize the impact of Industry 4.0 — it's another to effectively implement automation technologies in real life. In our Definitive Guide to Warehouse Automation, we'll break down the basics of this new revolution, dig into key benefits and potential drawbacks, examine emerging technologies, and offer a best practice checklist to help companies find their best-fit automation solution.

LET'S GET STARTED.

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WHAT IS WAREHOUSE AUTOMATION?

Before diving into the specifics, it's worth breaking down the basics: What, exactly, is warehouse automation? How does it work, and where is it commonly applied across warehouse operations?

In short, warehouse automation is the adoption of any technologies that help bridge the physical/digital divide to reduce the need for manual labor and increase overall efficiency. In some cases, this means the deployment of physical devices such as advanced machinery or autonomous robotics. In other instances, it is the implementation of next-generation warehouse management software capable of identifying and correcting productivity pitfalls.

As a result, there's no one "right" way to create an automated warehouse environment. While larger warehouses with expanding physical footprints may be best served by emerging robotics solutions, smaller firms or those with increasingly complex order and picking processes may start with agile software systems capable of meeting demands of both scope and scale. Other firms may implement both options simultaneously and rebuild processes from the ground up to improve accuracy and efficiency.

Ultimately, it's not form that matters, but function — no matter what framework firms choose, warehouse automation implementations are successful if they reduce overall costs, improve current outcomes, and help companies identify the next steps for ongoing efficiency gains.

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WHAT ARE THE BENEFITS OF WAREHOUSE AUTOMATION?

Recent survey data found that 95 percent of warehouse companies are now looking to lower costs across their organization. It makes sense; as both consumer and corporate expectations around speed and service evolve, warehouses need ways to enhance efficiency without breaking the bank.

Warehouse automation offers a way to streamline current processes and improve existing platforms to meet these emerging demands, but there's no one-size-fits-all solution here. What works for one company may not benefit another. The tools and technologies that drive efficiency in one case may, in fact, frustrate efforts somewhere else. Asa result, effective warehouse automation efforts start by identifying operational use cases and then mapping the following advantages to existing business processes.

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While individual applications will vary across operational verticals, warehouse automation offers value across six key areas:

EFFORT OPTIMIZATION

As noted by DC Velocity, the rapid uptick of e-commerce sales, "shines a light on the need for fully automated, robotic fulfillment centers." It makes sense: While manual effort makes it possible to meet current demand curves, the increasing need for right-now order receiving, picking, packaging, and delivery means that manual labor simply isn't efficient enough to keep up with rapidly evolving expectations. Combined with the ongoing challenges of finding, hiring, and retaining skilled labor for warehouse operations, it's now critical to optimize effort wherever possible with warehouse automation. From robotic order-picking processes to adaptive mapping tools and label scanning solutions, reducing manual labor is an important driver to increasing operational output.

EFFICIENCY IMPROVEMENTS

The shorter the time between order acceptance and fulfillment, the better the warehouse profitability. If orders take longer than expected — due to operational delays or data errors — the results range from damaged partner relationships to lost revenue. Automated tools can help reduce turnaround times while increasing order accuracy, in turn boosting efficiency while significantly limiting the potential for human error.

ENHANCED INVENTORY MANAGEMENT

Effective inventory management matters more than ever as companies shift to just-in-time stock and supply modeling. While many warehouses are now increasing physical footprints to meet emerging demand, there's an industry-wide understanding that keeping more stock on hand isn't ideal for operations. In the warehousing business, after all, space is money. That's why companies need just enough inventory to meet demand while maximizing both shelf space and speed. Advanced automation solutions that deliver real-time stock levels allow warehouses to gain granular control over inventory and ensure they always have what they need, when they need it.

EXCEPTIONAL ORDER ACCURACY

Order accuracy helps reduce redundant processes. If orders are picked, packed, and shipped the right way the first time, then costly product returns are drastically reduced. Here, automation can help companies overcome the natural tendency of human beings to make errors when they're completing repetitive, data-intensive tasks. Despite best efforts, humans simply can't compete with digital processes when it comes to order accuracy. By deploying automated software tools capable of self-checking and confirming order details, warehouses can reduce the risk of unexpected order errors.

IMPROVED CUSTOMER SATISFACTION

With consumer choice expanding, it's more critical than ever for warehouse companies to ensure they're not the weak link in the product chain. Customers now expect the ability to trace products from initial order to eventual arrival, and this includes their journey through warehouse operations and even returns. Automated software tools can help collect key product origin and arrival details along with describing the journey of items through warehouse operations, in turn providing customers with the comprehensive traceability they now demand.

END-TO-END VISIBILITY

Data-driven automation solutions can also provide complete process visibility in real-time – from the moment products arrive on-site to the second they're shipped out the door. Not only does this provide the critical customer transparency noted above, but allows organizations to assess every aspect of their process to identify potential pitfalls. With end-to-end visibility, warehouses can discover which processes are working as intended, which require adjustment, and which need to be rebuilt from the ground up to ensure operational success.

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HOW DOES WAREHOUSE AUTOMATION HELP ADDRESS THE CHALLENGES OF MODERN WAREHOUSING?

The biggest challenge faced by modern warehouses? Complexity. This starts with existing processes, many of which were never designed to work with always-connected, on-demand solutions. Continually-evolving expectations around order times, accuracy, and just-in-time inventory access, meanwhile, conspire to create a host of issues that frustrate the efforts of warehouse staff to eliminate redundant efforts and improve operational outcomes.

As a result, we've identified five key challenges for companies to identify and address that — if left unchecked — can significantly increase complexity.

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LEGACY SOLUTIONS

Legacy tools typically fall under the category of "if it's not broken, don't fix it". While this approach allows companies to ensure consistent operations over time, it doesn't account for emerging expectations around always-on connectivity and real-time visibility. For example, while many legacy warehouse processes are "good enough" to complete specific tasks, they aren't designed to interact with emerging cloud-based or mobile solutions, leaving companies with two less-than-ideal choices: Attempt to bridge the gap with third-party applications and services or keep key processes separate, in turn reducing overall efficiency.

LIMITED DATA VISIBILITY

Real-time, accurate data is paramount to success in warehouse operations. Knowing how much time it takes to complete specific tasks, understanding how new shipments impact stock levels, and addressing workforce requirements based on current and forecast demand can help ensure that companies have the agility they need to respond on demand as customer and partner needs evolve. The challenge? Many companies don't have reliable access to this information, let alone a framework that allows the widespread collection and evaluation of this data. The result is a missed opportunity — operationally relevant information that could improve process performance.

LABOR-INTENSIVE OPERATIONS

Manual processes have long been accepted as par for the course for warehouse operations — but are starting to be recognized for causing significant efficiency issues. Consider pallet measurement and weighing. For example, if staff make a mistake when evaluating and recording this data, extra time and effort are required to find the problematic pallet and reassess its measurements to ensure accuracy. Best case scenario? Workers must complete the same task twice, wasting time. Worst case? Incorrect data negatively impacts shipping and delivery outcomes leading to chargebacks and complaints, reducing overall revenue and customer satisfaction.

SILOED SYSTEMS

Standalone warehouse management systems that run parallel to other operations across the organization fail to deliver a full picture of the truth. While this segmentation may help increase the accuracy of self-contained processes, it also creates a silo effect that limits overall efficacy and collaboration.

LARGE-SCALE COMPETITION

Consumer expectations around warehouse processes are changing. The largest driver of this change stems from the so-called "Amazon Effect" — the difficulty that companies across industries face when competing with the online retail giant. For warehouses, the Amazon Effect comes down to transparency and cost: customers now expect fast, free delivery that allows them to track shipments from initial order confirmation to product arrival at their door. Existing warehouse processes simply don't provide the visibility and accuracy required for companies to keep pace with on-demand order expectations.

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WHAT KIND OF WAREHOUSE AUTOMATION TOOLS EXIST TODAY?

There are two broad categories of warehouse automation tools: digital and physical.

Digital tools are typically standalone software or more complete platform solutions that address the need for improved data gathering, analysis, and action. These digital offerings are designed to integrate with existing enterprise resource planning (ERP) systems to shorten the distance between data collection and actionable insight by combining multiple datasets.

Physical solutions, meanwhile, include any type of robotic or automated technology that reduces the need for manual, repetitive processes. For example, automated "picking" solutions can identify the location of specific inventory items in a warehouse, retrieve them, and then prepare them for staff to package.

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Some of the most common warehouse automation technologies now deployed to meet the requirements of Industry 4.0 include:

PERSON-TO-PERSON COMMUNICATION SYSTEMS

Increasing warehouse square footage makes it harder and harder for staff to communicate effectively. The challenge? Person-to-person interaction remains a critical component of efficient warehouse processes. As a result, it's now critical for companies to deploy digital voice communication tools that empower staff to quickly connect — no matter their physical distance — in turn helping them avoid redundant efforts when it comes to locating or processing orders.

AUGMENTED ROBOTIC ASSISTANCE

As robotics technology becomes more advanced and less costly, more warehouses can now benefit from the targeted adoption of robot assistance. This could be as simple as a grabbing arm capable of safely picking specific products from large shelving units to more complex packaging machines with the ability to prepare products of any size and shape for shipment.

CONNECTED STORAGE AND RETRIEVAL SOLUTIONS

As the physical scale of warehouses expands, it becomes more difficult for staff to quickly store and retrieve products. Here, tools such as automated storage and automated retrieval (AS/AR) solutions can help streamline the process. By using a combination of intelligent vehicles, lifts, and cranes equipped with real-time warehouse data, it's possible to reduce the time required to pick, pack, and ship product orders.

AUTOMATED PACKAGE DIMENSIONING

Pallet, cargo, and package measuring and weighing is a critical step to ensure accurate, on-demand inventory data and efficient movement of stock. But the sheer number of pallets handled by staff each day introduces the problem of human error: if staff accidentally transpose weight and height dimensions or make a mistake when recording key data points, productivity suffers and costs ensue. Automated tools — such as the Dimensioner by Magaya— allow warehouses to accurately measure and weigh pallets and significantly reduce the risk of human error.

SOFTWARE-DRIVEN BACKEND INTEGRATIONS

Data in isolation doesn't drive actionable results. Automated backend data collection tools help ensure that inventory, shipping, and staffing data are integrated across the warehouse to eliminate data silos and ensure that both floor managers and C-suite executives are equipped to make data-driven decisions.

MATERIALS HANDLING MACHINERY

Conveyor belts are nothing new in warehouse operations. But, by augmenting these mainstay material handling tools with real-time data around existing stock levels and current demand, it's possible to greatly improve overall warehouse efficiency. The old meets the new, and together, they work wonders!.

PICKING PRODUCTIVITY TOOLS

Despite the uptick of robotic tools and technologies, staff remain the primary "pickers" of warehouse products. But increasing order volumes and inventory diversification create a new challenge for workers: Locating and retrieving specific items as quickly as possible. With warehouse configurations constantly evolving to meet emerging demands, product locations may change day-to-day and week-to-week, frustrating staff efforts to quickly find what they're looking for. Barcode-based technologies that leverage mobile device infrastructure can help give staff the edge they need to find exactly what they need, when they need it.

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BEST PRACTICES FOR IMPLEMENTING WAREHOUSE AUTOMATION TECHNOLOGIES

The implementation of warehouse automation technologies doesn't happen in a vacuum. Fully-operational warehouses cannot afford the downtime of a full shutdown to deploy new solutions. Companies must also address the human impact of technology adoption — how will new systems change everyday staff operations? How will workers effectively interact with new technologies?

Start with our best practice checklist to ensure automation adoption delivers the intended results.

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1. BEGIN WITH NEEDS, NOT WANTS

While the proliferation of advanced, automated warehouse technologies makes it tempting for companies to rapidly adopt new solutions across the organization, this approach to improving outcomes and streamlining processes can actually have the opposite effect. Here, it's critical to deploy warehouse automation solutions that address key needs - and contribute to priority KPIs - rather than anticipating potential wants. Consider a small-footprint warehouse with generally efficient door-to-door goods flow but struggling with chargebacks due to inaccurate pallet dimensioning. Here, deploying automated pallet measurement makes sense because it addresses a key shortfall. Implementing new picking solutions, however, may cause more harm than good if staff are forced to abandon familiar processes for new frameworks. Put simply? Prioritize key operational issues to get the biggest benefit from warehouse automation.

2. ACCOUNT FOR THE HUMAN CONDITION

As noted by Gartner, the industrial automation market is now worth more than $213 billion as companies look to automated key processes and streamline operations. But this focus on digital-first solutions can cause pushback from existing employees who worry that they're in jeopardy of being replaced by more efficient electronic alternatives. As a result, efforts to implement automation often run afoul of the human condition if staff are actively opposed to digital deployments. To combat this concern, it's critical to account for the human condition by including staff in the automation process. Collect their opinions on what needs to be changed, what steps are necessary, and then build excitement by showcasing the potential benefits of specific solutions to help empower, not eliminate, human efforts.

3. ADOPT A STEP-BY-STEP APPROACH

Slow and steady wins the race. As many companies discovered with rapid-fire cloud computing adoption, too much too fast can be just as problematic as falling behind the pack. Instead of deploying and managing multiple technologies at once, companies are better served implementing solutions step-by-step. By allowing staff time to familiarize themselves with new technologies, warehouses gain the advantage of increased operational speed and useful data — where are these solutions living up to expectations, and where do they need work? How can outcomes be improved?

4. MEASURE, MEASURE, MEASURE

Metrics can make or break automation implementation. While new picking, packing, and productivity solutions come with a host of potential benefits, warehouses will only recognize the full impact of these initiatives by identifying and tracking metrics that matter. Consider automated picking solutions. If current processes require an average of 10 minutes for staff to find, pick, and return products for shipping, new solutions must shorten that time to deliver improved performance. Warehouses are best served by identifying key metric markers and continually measuring outcomes to determine overall efficacy.

5. BUILD ON THE BASICS

As noted above, complexity remains the biggest challenge for warehouses. Automation offers the potential to reduce total complexity, but can also create a complexity conundrum if the drive to implement new solutions takes precedence over measurable output. By starting with the basics — reduced error rates, shorter picking times, and fewer manual processes — warehouses can build out operational frameworks that are fundamentally built on simplicity.

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HOW TO CHOOSE THE RIGHT WAREHOUSE AUTOMATION TOOLS FOR YOUR BUSINESS

When it comes to choosing the right warehouse automation tools for your business, it's easy to get overwhelmed. Even for companies committed to following the best practice checklist, the sheer number of options now available can create more problems than they solve — especially when the goal is to reduce complexity.

To identify the right solution, start by asking the right questions.

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1. WHAT PROCESSES ARE IN PLACE TO SUPPORT THIS TECHNOLOGY?

This includes an examination of current technologies, training, and techniques that can help facilitate the adoption of new solutions. For example, warehouses with robust network infrastructure are in a better position to adopt data-driven solutions that require significant information throughput.

2. WHAT'S THE END-TO-END IMPACT?

Processes don't exist in isolation. To find the best-fit automation option, companies must consider not only how front-line staff will interact with new solutions but also how these technologies will deliver downstream data and impact other processes in the delivery and supply chain.

3. WHERE WILL THESE TOOLS SAVE TIME?

It's one thing to onboard new technologies that come with the promise of improved performance — it's another to recognize the broad gains they deliver. As a result, it's critical for companies to connect the dots between potential impacts and practical enhancements to deliver operational success.

4. HOW MUCH DO TOOLS REALLY COST?

To ensure new solutions deliver reliable ROI over time, companies must consider both up-front costs and the total cost of ownership (TCO). This includes evaluations of the initial purchase price combined with potential maintenance costs in the case of physical systems, and the ongoing costs of software licensing and support for software-as-a-service tools.

5. WHERE DOES DATA LIVE?

Data collected by automation tools must be immediately accessible to deliver actionable outcomes — but must also be stored securely. As a result, it's critical for companies to understand how data will be handled, where it will be stored, and what measures are in place to help protect production data.

6. IS THERE ROOM FOR PRE-OPTIMIZATION?

Before deploying new automation tools, it's worth considering the potential for pre-optimization. This could take the form of creating physical space for new warehouse floor tools, or eliminating legacy software solutions that don't play well with new technologies.

7. HOW DOES THE SOLUTION SCALE?

Warehouse requirements aren't static — both inventory levels and customer demand fluctuate over time. This is especially critical as pandemic pressures reshape the nature of purchasing and package delivery; as a result, companies must prioritize solutions capable of scaling with key processes as demands evolve.

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8. WHO'S IN CHARGE OF THE DEPLOYMENT PROCESS?

Human interaction remains the defining characteristic of effective warehouse automation. To ensure solutions deliver on performance potential, it's critical for companies to assign specific individuals who are in charge of deployment. Typically, this includes a C-suite champion to provide executive support and budgetary assistance, along with a front-line manager who can help tailor deployments to specific warehouse needs.

9. HOW WILL IMPACT BE ASSESSED OVER TIME?

To ensure potential and performance alignment, companies must determine key metrics and regularly assess automation impacts. This means measuring initial performance against historic operations, then regularly evaluating performance to determine if initial benefits remain steady over time.

10. WHAT'S THE DIRECT IMPACT ON STAKEHOLDERS AND CONSUMERS?

Automation is only effective if it delivers measurable benefits to both stakeholders and consumers. As a result, it's important to ensure new processes around packaging, picking, and shipping can be articulated to both groups in relevant, relatable ways. For executives, this means a focus on line-of-business benefits such as profitability and TCO, while customers require transparent processes that make it possible to track packages and products from their origin point to their eventual destination without interruption.

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# FORGING THE FUTURE OF WAREHOUSE AUTOMATION

Despite rapid uptake in recent years, Industry 4.0 remains largely in its infancy as new technologies emerge, standards evolve, and potential efficiency gains increase. Given the potential impact of warehouse automation on both existing processes and evolving expectations, however, companies can't afford to ignore the impact of these tools — effective implementation is now critical to leverage the benefits of big data, bolster staff efficiency, and bridge the gap between digital and physical processes.

It's not enough for companies to simply deploy new tools and technologies across existing frameworks. To ensure automated alternatives deliver on operational potential, firms must assess their current needs, identify existing challenges, assess best practice processes, and ask the right questions to find best-fit automation options.

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MAGAYA WAREHOUSE AUTOMATION SOLUTIONS
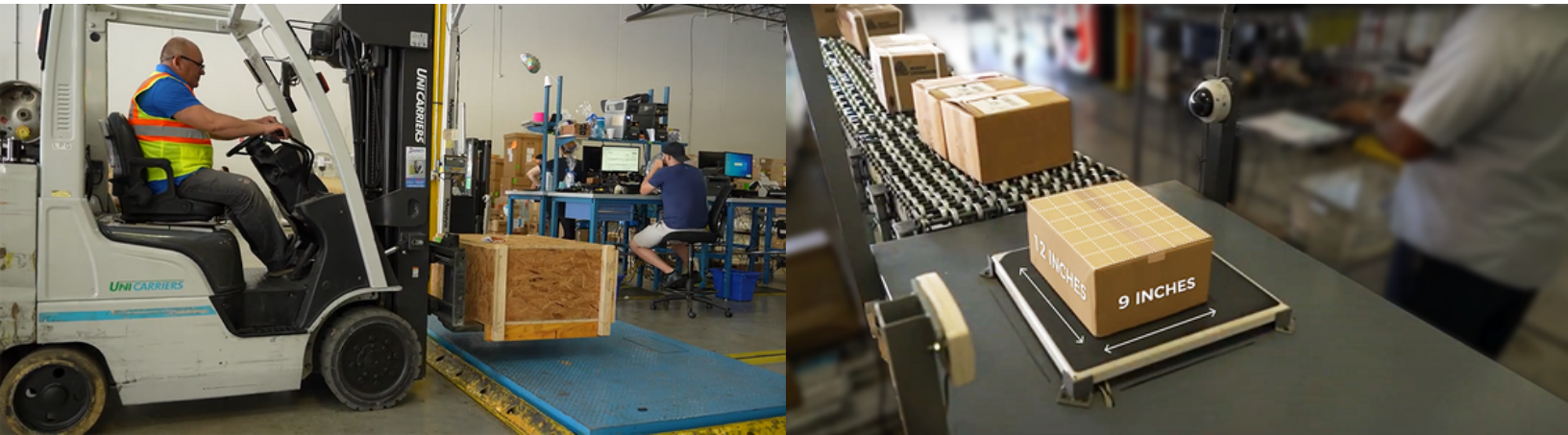
DIMENSIONER BY MAGAYA

Recording pallet, parcel, and cargo dimensions manually, taking photos, downloading the photos, and making sure they're attached to the right record in the system, is an error-prone process and a productivity killer.

Being off by even an inch in each direction adds up quickly when cubed. Our customers recoup $40 of lost revenue and save 3 minutes on average per pallet by recording maximum dimensions automatically - and instantly - with Dimensioner.

If you're looking to grow, this is one task that *must* be automated. Dimensioner turbocharges your warehouse with cutting-edge warehouse automation to save time and money, so you get accurate pallet measurements, the first time and every time.

Dimensioner by Magaya is a physical hardware device that automates the slow, manual, error-prone warehouse process of gathering weights and measures for pallets, parcels, and cargo. Dimensioner scans parcels and packages in mere seconds, drastically increasing efficiency. Plus, it automates and complements existing warehouse workflows, increasing revenue by recording maximum dimensions accurately, and preventing chargebacks and other fees related to measurement errors. In this industry, being off by even a quarter of an inch per pallet can quickly add up to hundreds and thousands of dollars in lost revenue.

Dimensioner can be used with Magaya Supply Chain or the WMS of your choice. You can use the tool with any system of record you have with our open API. Plus, Magaya's Device as a Service (DaaS) model eliminates the high upfront cost of traditional dimensioning tools, making the Magaya Dimensioner the most cost-effective dimensioning device on the market today.

Dimensioner is easy to install: our expert team will set up the hardware in your warehouse, allowing you to get started quickly. The support doesn't end there: Magaya is here for you to guide you through best practices and answer any questions that arise along the way, ensuring you gain the most value from your device.

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BINDER BY MAGAYA

Binder saves you time and money with a mobile app that lets you use your phone or tablet to capture and instantly upload photos of your parcels, pallets, cargo, and more. You can record snapshots from anywhere in your warehouse, even inside cargo containers to speed up the loading or unloading process.

Eliminating the need for cameras, cables, or memory cards, you can attach photos, barcode labels, documents, PDFs, checks, and more directly to your Magaya system in seconds.

Whether you're processing a warehouse receipt or shipment, you can keep accurate records by attaching photos to the transaction with Binder, giving you and your customers full visibility via LiveTrack, our mobile tracking and visibility app.

MAGAYA WMS AND FLOW WMS

Awarded as a leader in Warehouse Management by G2 year after year, the integrated WMS capabilities in Magaya Supply Chain give users the powerful, modern tools needed to stay organized and efficient.

With a single platform to record the arrival and location of cargo, SKUs, serial numbers, lot numbers, and across multiple warehouses, users can manage their workday more efficiently with centralized insights on real-time inventory, orders, and more.

Make your warehouse smarter with directed operations, a series of intelligent workflows and sequences that optimize warehouse space and employee time. Boosting your revenues and profit margins, Magaya is not only used for receiving, storing, and shipping cargo but also replenishing orders, and has directed (i.e., guided) put away and picking sequences. These processes all work together to optimize how items are put away so it will be easier to pick them later - to fulfill orders faster.

Magaya's intelligent WMS workflows between warehousing and shipping allow you to load cargo directly onto outbound shipments. The solution allows you to easily send tracking numbers and inventory updates to the recipient, consignee, or agent - the moment you ship the order.

What's more, the Flow WMS mobile app designed for Android™ and iOS™ will give you full control of every item in your inventory without having to log extra steps to a fixed workstation. Get the real-time visibility and functionality you need for efficient warehouse operations, including fast receiving, picking, and loading. With flexible, customizable workflows and complete control of your warehouse tasks, Flow WMS goes beyond basic warehouse inventory control, giving you true productivity in the warehouse.
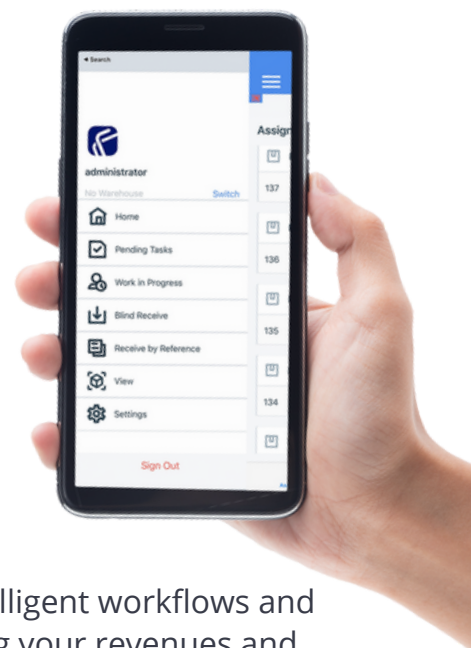
ABOUT MAGAYA

Magaya delivers a Digital Freight Platform that accelerates growth with flexible, interoperable, and modular cloud-based solutions designed to optimize and digitize end-to-end logistics operations and customer experience. Whether used together as an integrated digital freight platform or independently, Magaya solutions enable businesses of all sizes to streamline complex and redundant processes, enhance the customer experience, optimize productivity, reduce costs, and grow revenue. At Magaya, we are passionately devoted to ensuring our customers' success through our innovative technology and comprehensive array of related professional services. We take great pride in our people, experts in the field of logistics automation, who are always willing to go the extra mile for our customers. There are no limits to your growth with Magaya. Visit magaya.com to learn more.

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