



LOCUS

Total Guide to Warehouse Automation

Transforming Operations: From Manual
Workflows to Efficient Processes

By Mary E. Hart
Locus Robotics

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Introduction

Why Automate Your Warehouse?

As you walk through your warehouse each day, look around you. Do you see highly efficient processes that keep your facility running smoothly and your associates happy and motivated? Or do you see manual inefficient processes that have been in place since the day you started — or before then — and your associates looking pained as they pull heavy carts?

More than likely, it's time to improve your warehouse operations. Your facility can be more efficient, and you're not alone in that. More than 80% of warehouses aren't automated because they're still using the same old, ineffective manual processes.

It can be difficult for warehouses that are used to manual workflows to make the move to automation, because they don't want to mess with something that's working. Yes, manual workflows work, but

they could be better, and you could be fulfilling more orders in a timely manner every day. With automation, the opportunity is there to do even more than you're doing today by changing up your workflows and processes for a more optimized approach.

In every part of your warehouse, there are efficiencies that can be gained from automation — from unloading the truck to receiving, returns to inbound inventory, picking to shipping, and more and challenges that can be overcome, including finding, hiring, and retaining associates.

The Warehouse Labor Challenge

The number one challenge in a warehouse today is labor and it's in a variety of formats that include labor shortage, absenteeism, and high turnover rates. Labor shortage is a standard challenge, because you have more jobs open than you are able to fill, and more products going through your warehouse than people working to handle that product. With absenteeism, associates will go out sick or their child gets sick, and they don't have childcare, so they have to stay home. At the same time, market rates are going up and it's super competitive. In any warehouse distribution center park, you'll see job fairs happening every day with warehouses offering a raise of 50 cents an hour and a \$100 signing bonus if they start that afternoon. This competition leads to associate poaching and an increase in job hopping.

How can you keep the warehouse associates you have from leaving? You have to have a safe and enjoyable work environment, which does not mean making your associates walk up to 15 miles each day while dragging around a huge, heavy cart. They shouldn't have to worry about getting their feet run over by carts or running around forklifts or other safety hazards in your warehouse. Focus on your associates' safety and automate your warehouse in a way that helps them learn a new skill and is enjoyable.

7 Reasons to Automate

Besides the labor challenge, there are a host of other reasons why you should automate your warehouse.

- 1 Think Peak.** Whether your warehouse has a fixed season for peak volume increases, like back-to-school shopping or the holidays, or orders ebb and flow without a set reason year-round; you will be able to get any orders out the door on time when you automate instead of having to hire temporary help.
- 2 Decrease Onboarding Time.** When you do bring on new full-time or temporary associates, the right warehouse automation helps you to reduce that training time from weeks to minutes to increase your warehouse productivity.

3 Gain New Customers. Automation can be used as a marketing tool for your company, especially if you're a third-party logistics (3PL) provider, to show that you're innovating and solving customer challenges of labor and peak. Your potential customers will see that you can execute better and service their orders faster with a proof of concept.

4 Move Up, Not Out. If space is an issue for your warehouse, and you can't move to a new location with more square feet, going vertical and creating automated mezzanine levels can help. The best practice is to have coordinated automation such as autonomous mobile robots (AMRs) on every level. For each order, for example, you may have picks that need to be completed on three different levels. With the right solution, the system manages and optimizes the pick and pass process smoothly across those levels.

5 Track Product. One reason to automate your warehouse is to keep track of chain of custody, which is a big issue, especially for hard drives in data centers and for track and trace in the pharmaceutical industry. With warehouse automation, you reduce the number of touches that you have to make to get a product from where it's stored through to shipping, and you can track that product as it moves through the facility in real time.

6 Increase Safety. One of the big benefits of automating, which isn't necessarily obvious but does impact ROI, is the increased safety for your warehouse. Forklift incidents cause a large number of insurance claims and other expenses. To that end, anything you can do to take an operator-driven forklift out of the equation will ultimately save your warehouse money.

7 Reduce Costs. Automation can help in all areas of your warehouse, including picking, receiving, putaway, and more by improving efficiency and reducing costs, especially when you choose robots that can be used for multiple use cases and have a robots-as-a-service (RaaS) model that is covered by ongoing Operating Expenses (OpEx) rather than paying a large fee in upfront Capital Expenses (CapEx).

In every area of your warehouse, you should evaluate how you're currently executing your processes and consider if there's a business case for automation. One way you can do this is to bring in a third-party provider to help you prioritize, strategize, and bridge the gap to support your warehouse management system (WMS), warehouse execution system (WES), and controls.

When you're thinking about automating your warehouse, consider the entire flow throughout your warehouse's four walls. If 60 percent of your business

is outbound picking, another 10 to 15 percent might be inbound putaway; and three to five percent will be inventory control and counting, which are other areas where automation can help. Think about your whole warehouse, which can entail receiving and inbound; putaway and returns; replenishment and storage; forward/picking; packing; and shipping. In this eBook, we've separated each area of the warehouse into its own section to provide a deep dive.

Embarking on the journey of warehouse automation is more than just introducing new technology or speeding up existing processes; it's a process shift that will reshape your warehouse operations. With over 80% of warehouses still tethered to manual processes, the need for evolution is evident. From tackling the labor challenge to ensuring increased safety and reducing costs, the warehouse and fulfillment center automation landscape promises a number of solutions that go beyond mere efficiency.

Your focus should not merely be on one or two isolated processes but on the entire spectrum of warehouse operations contained within your four walls. The road to warehouse excellence starts with a single step, and that step is understanding the compelling "why" behind automation. Armed with this knowledge in this book, you can pave the way to a future where your warehouse isn't just functional but exceptional.

Introductory Action Items Recap

1. Self-Evaluate
Regularly observe your warehouse operations. Identify areas of inefficiency and compare the current status of manual processes with potential automated solutions.
2. Confront the Labor Challenge
Understand and address the issues of labor shortage, absenteeism, high turnover rates, and job hopping within your warehouse.
3. Prioritize Safety & Well-being:
Foster a safe and enjoyable work environment for associates to reduce turnover. Assess the safety hazards and look into automation solutions that can mitigate them.
4. Understand the Automation Benefits:
 - a. Prepare for peak seasons using automation to manage fluctuating order volumes.
 - b. Streamline the onboarding process for new hires using automation tools.

- c. Position automation as a marketing asset, showcasing innovation and efficiency to potential clients.
 - d. Consider vertical expansion and the integration of automation solutions, like AMRs, across multiple levels.
 - e. Use automation to maintain a real-time chain of custody, ensuring product tracking.
 - f. Enhance warehouse safety by reducing human-operated equipment like forklifts.
 - g. Assess the potential cost reductions through automation and explore financing options like RaaS.
5. Holistic Process Evaluation:
- Consider a third-party provider to evaluate your current warehouse processes against the potential benefits of automation. This will help in identifying gaps and streamlining integration with existing systems like WMS and WES.
6. Think Warehouse-Wide:
- Look at the big picture. Break down the percentage of tasks like outbound picking, inbound putaway, and inventory control. Analyze each segment's potential for automation.

7. Deep Dive into Each Area:
- As outlined in the upcoming sections of this eBook, delve deeply into each area of the warehouse to understand its unique automation needs.
8. Shift Your Mindset:
- Understand that transitioning to automation is not just about technology integration; it's a comprehensive shift in operations.
9. Stay Updated:
- Recognize that warehouse automation is a continuously evolving landscape. Keep abreast of the latest technologies and trends to ensure your warehouse remains efficient.
10. Begin the Journey:
- With the insights from this book, take proactive steps toward automating your warehouse. Start by understanding the 'why' and then transition to the 'how' of automation.

By following these action items, you can kickstart the transformation of your warehouse from a traditionally manual operation to a modern, automated, and efficient entity.



Chapter 1

9 Top Tips to Improve Warehouse Operations

Warehouse managers across all industries know they need to improve their productivity and efficiency. It's tough to make that the focus when firestorms of labor challenges and getting orders out the door cause warehouse optimization to take a back seat. It's time to look at your warehouse operations and be tactical and proactive instead of only reactive to changing daily priorities. Take a look at these top tips that you can implement for warehouse optimization.

1. Create an Ergonomic Warehouse

Provide sufficient lighting in your warehouse to reduce time searching for items and eyestrain on your associates. If workers will be standing in one spot for most of the day, invest in anti-fatigue mats to cut down on feet, legs, and backaches. This also applies if associates are sitting on very old chairs

with bubble wrap attached to them. Adjustable height packing stations are also critical for associates. Place signs around your warehouse reminding workers to stretch at various intervals. You should also incorporate regular breaks into work schedules to keep people sharp.

2. Plan for the Full Year

As companies rush to automate, they often focus just on what's going on at that point in time instead of thinking long-term. When companies move to warehouse automation during the peak season, they could build too big for the rest of the year and be stuck with conveyors or other fixed structures that don't provide a return on investment. If you bring on automation during a non-peak time, you'll find yourself struggling to keep up with orders at peak. The best warehouse automation solution is one that will seamlessly adjust and scale for peak season.

3. Keep Employees Safe

When you have manual processes in your warehouse, your associates are pushing heavy carts, which can result in fatigue and repetitive stress injuries. Riding a pallet jack can also result in collisions and injuries to associates. How? When an associate is riding material handling equipment (MHE), they're going anywhere from six to 10 miles an hour and are transporting a lot of mass. This expensive equipment increases the possibility of the associate being injured, which would result in an economic loss to your warehouse.

4. Establish a Clear Process Flow

One of the largely overlooked parts in warehouse operations is the interface between replenishment and picking and also picking and packing. Warehouse managers can look at these areas in a silo while trying to align balance. If you don't look closely at the process of how you're feeding work, or having work fed to each section from the adjacent processes, you're creating a new bottleneck. One way to do this is to see if you have appropriate staging room for each process, and really think about the process, such as carts coming into a pack station and where those carts should go when they're done. This doesn't have to be a massive step in the process, but if all of a second, your packer is only 80% utilized because 20% of their time is spent moving carts around so there is space to bring more carts around, you'll know if you actually need more packers, or you need a better flow between processes.

5. Focus on Higher-Value Tasks

If a very automated piece of equipment is handling the movement of material it frees up the warehouse operator to perform other tasks that are higher value. When you automate, you not only improve your warehouse productivity, but you're also leveraging your human resources much more effectively.

6. Cross-Train Associates

Warehouse associates are typically trained only for the specific tasks for their job. That isn't the best practice because your warehouse is going to have callouts. While you don't need every warehouse associate to be able to do everything, you should train them on the tasks that happen before and after their area so they can move around and help out as needed.

7. Think of the Four Walls

Warehouse managers who are trying to solve fulfillment issues are looking for ways to efficiently get ecommerce orders out on time, but sometimes only focus on putaway and picking. Think about how you can improve productivity throughout your entire warehouse, not just in one area. If you pick faster, you also want to pack faster to get the orders onto the trucks and out the door. Otherwise, the operational efficiency is lost.

8. Simplify Work in Process

Most warehouses work in the model of picking multiple orders at the same time, putting them into one main batch, and then sorting at the packing and sortation section into various outbound cartons. There are a number of ways to implement warehouse optimization. One suggestion is to pick directly into the box that is shipped out, which eliminates the need for separate packing and reduces the number

of touches. The other is to do batch picking for a single-unit pool.

9. Automate with Robotics

AMRs such as those from Locus Robotics will help improve warehouse operations in all areas, from putaway to packing; each (or piece) picking to pallet transportation and case picking with pallet moving and heavy payload robots.

The Locus solution dramatically improves worker productivity 2x to 3x, enabling higher pick rates, lower labor costs, and faster cycle times. In addition, your warehouse associates can seamlessly alternate between picking and re-stocking/putaway, helping improve the overall efficiency of your warehouse operation and save labor costs with true task interleaving.

In the dynamic world of fulfillment and warehouse management, the balance between immediate needs and long-term optimization can often seem elusive. Yet, as this chapter underscores, it's vital to continually refine and adapt your operations to changing demands and challenges. Whether it's crafting an ergonomic environment for your staff, understanding the ebb and flow of seasonal demands, prioritizing safety, or integrating cutting-edge robotics, it's clear that a successful warehouse is an evolving entity. Embracing these nine key strategies will position your warehouse not only to react efficiently to day-to-day challenges but to anticipate and thrive in the ever-shifting landscape of warehouse operations.



Chapter 1 Action Items Recap

Create an Ergonomic Warehouse

- Ensure proper lighting to reduce search time and prevent eye strain.
- Use anti-fatigue mats for stationery positions.
- Invest in quality chairs and adjustable packing stations.
- Put up reminders for stretching and schedule regular breaks.

Plan for the Whole Year

- Don't just automate for peak seasons; think about the entire year.
- Avoid over-investing in permanent structures based on peak demand alone.
- Find adaptable automation solutions.

Prioritize Safety

- Minimize manual processes that cause fatigue and stress.
- Be cautious with material handling equipment to prevent injuries.

Have a Clear Process Flow

- Focus on interfaces, especially between replenishment and picking, and between picking and packing.
- Eliminate bottlenecks and ensure smooth transitions between processes.
- Evaluate staging areas and flow between processes.

Emphasize High-Value Tasks

- Use automation to free operators for more important roles.
- Leverage human resources effectively alongside automation.

Cross-Train

- Upskill human associates beyond their specific tasks.
- Train them for the processes before and after their main task.

Think of Your Whole Warehouse

- Look beyond just putaway and picking.
- Improve efficiency throughout the warehouse to ensure end-to-end productivity.

Reduce Work in Process

- Reconsider batch picking methods.
- Pick directly into final shipment boxes when possible.
- Evaluate single-unit pool batch picking.

Embrace Robotic Automation

- Use AMRs for tasks ranging from putaway to packing.
- Adopt solutions like Locus Robotics for 2x to 3x productivity improvement.
- Incorporate task interleaving to optimize labor costs and efficiency.



Chapter 2

How to Automate Receiving

Receiving might be the least automated aspect of a warehouse, but it's crucial to optimize this step. Imagine a system where trucks are automatically guided to the right sections, materials are effortlessly offloaded, products are instantly recognized, and everything finds its place with pinpoint accuracy. Sounds like a dream? That's what automation promises.

Why Automate Receiving?

The goal is simple: Touch the product fewer times. Every time a product is handled, there's a risk of damage or misplacement. By automating, these risks plummet.

Journey Before the Dock

Trucks don't just appear at the dock — there's a whole process. It begins in the yard, where trucks, trailers, and pallets come and go. Automated yard management ensures seamless dock scheduling. If you know

which inventory is arriving and when, you can prioritize based on demand and stock levels. It's about having a bird's eye view, ensuring the right inventory enters the right dock, streamlining processes, and enhancing efficiency.

Understanding Labor Needs

With possibly hundreds of dock doors, visibility is paramount. Without automation, it's challenging to gauge the workforce required. For optimal efficiency, you should know which inventory is next in line and which door it should enter through.

Streamlining the Receiving Process

Ensure your supply and compliance are in order upstream. When the right procedures are in place, goods can be swiftly scanned, checked in, and moved for storage, eliminating time-consuming processes.

Unloading: The Challenges and Solutions

Receiving, while crucial, is also tough. Here's a snapshot of what automation can bring to the table:

- **Type of Load:** Different trucks bring in containers, pallets, or a mix. Automation solutions like Boston Dynamics' Stretch™ or Honeywell's Robotic Unloader can transform the labor-intensive unloading process.
- **Pallets:** Think autonomous forklifts like Trey from Gideon that not only save time but also enhance efficiency by over 80%.

- **Transportation Within the Warehouse:** Post unloading, automated systems like SeeGrid, Vecna, or Locus Origin and Vector can swiftly shuttle material to their destinations, reducing manual effort and potential errors.

Innovations in Unloading

- **Vision-Based Carton Unloading:** Solutions like Destuff-it™ use vision-based robotic systems to reduce strain on workers, optimizing the unloading process.
- **Forklifts:** These stalwarts of warehousing can be optimized for shorter trips, aiding in quick unloading.
- **AMRs:** Robots like Locus Origin and Vector are revolutionizing intra-warehouse transport, bridging the gap between unloading and storage.
- **Gravity Conveyors:** Offered by companies like Hytrol, these allow products to smoothly transition from the trailer to the dock.
- **Case Unloading:** Solutions like Boston Dynamics' Stretch™ ensure automated unloading of cases.
- **Depalletizing:** Automation can assist in breaking down pallets into individual cases for easier storage.

The Power of Advanced Shipping Notice (ASN)

With ASN, the supplier offers detailed information about a pallet's contents via a barcode. This simple step can revolutionize the receiving process, eliminating the need for time-consuming three-way checks.

Staging and Movement: Efficiency at its Best

In larger warehouses, “running the pallets” is a norm. Automated systems, from forklifts to AMRs like Locus Vector, ensure goods swiftly move from the receiving dock to their respective storage spots. The focus is to minimize manual effort, maximize safety, and optimize resources.

Looking at the Big Picture

Warehousing isn't just about receiving or putaway. It's about looking at the entire process holistically. Marrying receiving with putaway using automation ensures smooth inbound throughput. As we move forward, automation is set to play an even more significant role, reshaping warehouses and redefining efficiency.



Chapter 2 Action Items Recap

Importance of Automating Receiving

- Streamline processes, improves accuracy, and reduces errors.
- Minimize the number of times a product is touched, reducing potential damage or misplacement.

Pre-Receiving Activities

- Yard Management: Coordination of trucks, trailers, and pallets into and out of the yard.
- Dock Scheduling: Ensures visibility of inbound loads, optimizing labor planning.
- Supply & Compliance Upstream: Prior verification to enable smooth scanning and putaway.

Five Methods to Automate Unloading

- Vision-Based Carton Unloading: Ergonomic conveyor systems like Destuff-it™.
- Forklifts: Efficient for unloading pallets or crates.
- AMRs (Autonomous Mobile Robots): Devices like Locus Origin and Locus Vector for point-to-point transport.

- Gravity Conveyors: Products slide down onto the dock.
- Case and Pallet Unloading: Robots like Stretch™ for case unloading; automation for depalletizing.

Advanced Shipping Notice (ASN) Benefits

- Streamline receiving by avoiding the traditional three-way match of physical items, packing list, and purchase order.
- Facilitate efficient inventory verification using barcode scanning.

Staging and Transport

- Large warehouses require “running the pallets” or moving unloaded items to a staging area.
- Autonomous forklifts or AMRs, like Locus Origin or Vector, are beneficial for optimizing product movement within the warehouse.
- Using robots for lengthy transport jobs enhances safety and reduces the need for manual forklift operations.



Chapter 3

How to Automate Putaway and Returns

In the bustling heart of the warehouse, the spotlight often shines on the items ready to be dispatched. However, the unsung heroes – the pallets and cases waiting to be tucked away – play an equally pivotal role. These pallets, typically heading to the picking area, aren't just stashed haphazardly. They embark on a journey through your warehouse to be placed in strategic locations.

Imagine a world where your associates no longer trudge across vast warehouse expanses (up to 15 miles potentially each day) with heavy items or push cumbersome carts that can weigh up. That's where point-to-point (P2P) transport automation technologies come into play. These solutions transport goods directly to their designated spots, streamlining the putaway process.

Putaway and storage are often overlooked in discussions about automation. However, pioneers in the industry recognize the immense benefits of automating these areas. With the right technology, items can be sent directly to prime locations, drastically reducing unnecessary movement. Further, using data analytics, warehouses can identify fast and slow-moving products and strategically position them to cut down travel distances.

Maximize Movement with Drop Zone Logic

Automation technology for putaway is straightforward and becomes almost intuitive when you introduce a well-defined and mapped drop zone logic. The mantra is simple: the better the quality of your pallet and the integrity of your unit load, the more you can and should consolidate. Harness the power of efficiency and transport up to four pallets, handling four distinct drops in just one sweeping move.

The Mile-Long Challenge

In certain warehouses, the journey from receiving pallets to the docking bay can feel like an endless trek. Picture someone manually dragging a pallet for a quarter mile, only to return with an empty pallet jack. Beyond the evident safety risks, the inefficiency is palpable. Robots, however, can handle these marathon walking tasks with precision, reinforcing both efficiency and safety.

Once the robots transport pallets to their destinations, it's time for the forklift drivers to take center stage. These skilled operators, equipped with their machinery, should be focused on specific zones where their expertise truly shines – retrieving pallets from drop-off points and ensuring they nestle perfectly into the racks.

Returns: The Trickiest Turn

Returns can be the wild cards of the warehouse world. These products often come back in disarray, demanding meticulous sorting. With warehouses prioritizing dispatch over restocking, the challenge is twofold: ensuring efficient putaway while maintaining inventory accuracy.

Shift-Smart AMRs

Adopt a dual-shift approach for your autonomous mobile robots (AMRs) that can handle both picking and putaway. Picture this: a morning crew of robots dedicated solely to putaway that seamlessly transition to help out the picking shift in the afternoon. It's all about working smarter, not harder.

Pro Tip: Unleash the power of interleaving. By integrating picking and putaway tasks, you cultivate a consistent flow. Not only does this method simplify training, but it also expands the horizons of your warehouse's automation potential.

Returns Management Tools

Returns can often turn into a chaotic mess of wondering where each item can and should go. When returns are handled inefficiently, it disrupts workflows and diminishes customer satisfaction. A dedicated return zone with specialized processes, resources, and oversight helps you to handle growing returns efficiently, safely, and profitably. With platforms like OptOro and ReverseLogix, you can manage your returns efficiently.

OptOro leverages AI and machine learning to streamline returns decisions. Advanced algorithms instantly determine optimal dispositioning for each return — whether resale, refurbishment, liquidation, or waste. This precision maximizes recovery value and minimizes processing costs. Their data tools also identify trends to proactively address root causes.

ReverseLogix optimizes return workflows using a modular, mobile platform. Their smart carts assist associates in validating, testing, refurbishing, repackaging and restocking items seamlessly. Automated sorting and put-to-light capabilities boost processing speed and accuracy. And dynamic routing matches inventory to optimal downstream channels in real-time.

Together, OptOro and ReverseLogix enable warehouses to handle escalating returns efficiently. Intelligent automation and data insights optimize

value recovery while delighting customers. By partnering with innovators like these, forward-thinking warehouses transform returns from pain to profits.

Sort it Out

Add in a tilt tray sorter to your warehouse automation to auto-drop each returned item into the right bin. This technology is traditionally coupled with conveyors, but it can be a formidable technology when paired with Locus Vector.

In the intricate dance of warehouse operations, automating the putaway and returns process emerges as a pivotal move. While dispatching items often grabs the limelight, the efficient stowing of pallets and handling of returns is the backbone that ensures a seamless workflow.

With the introduction of advanced P2P transport automation technologies, drop zone logic, and strategic robot utilization, warehouses can transcend traditional boundaries.

This chapter has illuminated how to harness these technologies, from maximizing movement to handling the intricate maze of returns and has emphasized the importance of a comprehensive strategy. As we transition forward, always remember that in the world of warehousing, innovation and adaptation are key. With the right tools and insights, every warehouse can redefine efficiency, safety, and accuracy.

Chapter 3 Action Items Recap

While picking and shipping often gets attention, efficient stowing of pallets is crucial to warehouse operations.

P2P Automation:

- Introduce point-to-point transport automation to streamline the putaway process and reduce manual labor.

Drop Zone Logic:

- Implement a well-mapped drop zone logic to make automation intuitive and effective. The principle: consolidate based on pallet quality and unit load integrity.

Tackle the Mile-Long Challenge:

- Use Autonomous Mobile Robots (AMRs) to handle long-distance transport tasks, ensuring safety and efficiency.

Forklift Focus:

- Strategically position forklift drivers where their skills are most required, ensuring pallets are placed efficiently in racks.

Handling Returns:

- Returns often come in disarray. Prioritize efficient sorting and restocking while maintaining inventory accuracy.

Shift-Smart AMRs:

- Employ a dual-shift approach for AMRs, focusing on putaway in the morning and transitioning to picking in the afternoon.

Returns Management Tools:

- Platforms like OptOro and ReverseLogix are essential for efficient returns management.

Embrace Tilt Tray Sorters:

- Paired with Locus Vector, tilt tray sorters can auto-drop returned items into the right bin, enhancing the sorting process.



Chapter 4

How to Automate Replenishment

In today's fast-paced warehousing world, staying ahead means embracing technology, especially in replenishment. In this chapter, we'll delve into the intricacies of automated replenishment, showcasing how modern warehouses are harnessing the power of tools and strategies to keep efficiency at an all-time high.

Replenishment Technology

When it comes to back stock replenishment, particularly for case movement, Locus Robotics shines with its offering — the Locus Vector. For dynamic replenishment, Vector works in harmony with lifts and carts.

Here's a scenario: Vector efficiently drops a cart off at a location that needs replenishing. While the associate takes over and restocks, Vector doesn't

stay idle. It moves on to another task and later, either that same Vector or a different one retrieves the now-empty cart, preparing it for another round.

Replenishing pallets, often termed as “let down”, presents unique challenges. When stocks run low in the forward storage area for a particular SKU, it prompts a replenishment task. Especially if it’s stored in high bay racking, the task involves bringing down the pallet from above. It’s here that tools like Vector and even Origin prove invaluable. Depending on the size of the product, they streamline the “let down” process, ensuring products are moved with efficiency and precision.

Inventory Control

Inventory control is more than mere counting. It’s about ensuring your virtual tally (what you assume you have) aligns perfectly with your physical stock. To keep accurate inventory, consider a solution that offers “low quantity confirmation.” This function proves useful when, for instance, the last item of a kind is picked. The system prompts the picker to verify the count, ensuring the digital records match the ground reality.

Where Should Returns Go for Replenishment?

Returns in e-commerce may seem straightforward for replenishment, but they’re anything but. Usually,

if someone bought a blue T-shirt and the black pants, the return that comes back would be either one or both of those units. As a best practice, you want to return that unit to the same SKU so that it gets back to its brother and sister items, as opposed to putting it in a totally separate bin where you’d be creating a new location for an item that already exists in the warehouse.

Warehouse technology can streamline this, reducing the footwork and ensuring products return to their original bins. Another advantage with automation is its ability to prioritize picking from returns, leading to improved stock rotation and efficiency.

Slotting, Strategy, and Replenishment Varieties

Replenishment isn’t just about restocking; it’s about doing it smartly. Advanced software like Slot3D and Opticity provide data-driven insights for optimal slotting. By feeding data into these slotting engines, warehouses can derive plans for ideal material placement.

When devising an automation strategy, decision-makers should focus on where the logic resides. Should it be embedded within the Warehouse Management System (WMS), the Warehouse Execution System (WES), or perhaps at the lower level of the lift truck controls? Once this is decided, the physical movement strategy, involving equipment like forklifts and AMRs, can be optimized for minimal travel time.

Replenishment methods can vary based on the facility's design and operations. For instance, a robotic solution could be instrumental in moving pallets from pickup to drop-off locations. In some warehouses, replenishment is initiated directly from the docks, maximizing efficiency. Incoming inventory can immediately be used to fulfill replenishment orders, skipping intermediary steps. Another approach involves the Vector driving directly to putaway locations, parking precisely in front of designated slots, making the replenishment process fluid and efficient.

SKU Management

Static SKU locations are a thing of the past. Modern warehouses are re-evaluating their replenishment rules to optimize space and reduce wasted trips. It's about questioning the frequency of replenishments and the lot sizes. For instance, if a product's inventory typically lasts a week, then replenishment should be aligned accordingly. On the flip side, products picked once every six months might be best fetched directly from the reserve.

As we round off this discussion, consider a typical replenishment scenario from long-term storage to the picking area. A pallet is taken off the shelf, placed on a robot, and transported to the picking zone. While an associate prepares items for picking, they're spared from the tedious task of moving the material, thanks to automation.

Automating replenishment is a game-changer in the warehousing landscape. As we've explored, replenishment automation tools and strategies are redefining efficiency standards. For modern warehouses aspiring for streamlined operations, embracing these innovations isn't just ideal — it's imperative. As we continue to navigate the future of warehousing, automated replenishment stands as a beacon, illuminating the path towards operational excellence.

Chapter 4 Action Items Recap

In the warehousing sector, technology plays a pivotal role, especially in replenishment. Stay updated with modern replenishment tools and strategies to ensure efficiency remains top-notch.

Prioritize Inventory Control:

- Don't just count; align your virtual tally with your physical stock.
- Use tools that provide "low quantity confirmation" to ensure accurate inventory levels.

Data-Driven Slotting and Strategy:

- Incorporate advanced software like Slot3D and Optricity for data-driven insights into optimal material placement.
- Define where the automation logic should reside: WMS, WES, or the lift truck controls.
- Plan your physical movement strategy with equipment like forklifts and AMRs to reduce travel time.

Redefine SKU Management:

- Move away from static SKU locations. Regularly re-evaluate replenishment rules for optimal space utilization.
- Tailor replenishment frequency based on the inventory lifecycle of products.

By following these insights and action items, warehouses can navigate towards greater operational efficiency and excellence.



Chapter 5

How to Automate Picking

When you're considering warehouse automation, your focus should be on where you can get the biggest bang for your buck in terms of ROI. Those high-value items are outbound picking, which is the bread and butter of every facility because that's what you ship and how you derive revenue. Picking also holds the highest amount of labor in a facility – typically 60-70% of a warehouse's labor focuses on picking.

The winds of change signal a shift in consumer expectations. With the demand for quicker deliveries, the expansive warehouses of yesteryear are evolving into more compact Micro Fulfillment Centers (MFCs). These "dark stores" in retail terminology aim to nestle closer to the consumers, ensuring faster delivery times, but that means the orders also need to be picked and fulfilled faster.

P2G vs Fixed Automation

In the warehouse and fulfillment world, there are two main technology options for order picking automation: the conventional fixed automation which can include goods-to-person (G2P) — or person-to-goods (P2G). Fixed automation refers to conveyors, shuttle systems, and the like that bring the material/goods to the person doing the picking or packing, while P2G typically refers to autonomous mobile robots (AMRs) that take the goods from the person doing the picking or putaway.

Fixed automation in the form of conveyors is easy to operate and a good way to get products off a dock and onto the warehouse floor. However, in order to put the material away, human workers or piece-picking technology (or both) is needed. Also, conveyors are set pieces in the warehouse and can't be moved around as your workflow needs change.

Shuttle systems are also a conventional, and expensive, form of fixed automation. They take up quite a bit of vertical space in a warehouse, which makes them not as appealing to warehouses that have mezzanines for multi-level workflows.

For both of these fixed automation solutions, the implementation process is long and work typically can't be done until the solutions are up and running. The implementation process includes lengthy design phases and can take anywhere from 12-24 months after the contract is signed. During a fixed

automation implementation, warehouses need to be completely shut down, which causes a significant disruption to existing warehouse operations.

Person-to-goods automation in the form of AMRs can be brought into any warehouse (greenfield or brownfield alike) and implemented in as little as four weeks without needing to move anything around.

The old worry that robots will take jobs is not at all accurate. Instead, AMRs are meant to do the work of the jobs that you can't fill, and the bots work alongside humans who do the picking or putaway. Once your associates start working with AMRs, they will see it for the benefit that it is, and that it makes their work life better and easier.

AMRs are also safer than fixed automation and don't have to be fenced off or segregated to protect human workers. Before AMRs, human associates walked — on average — up to 12 miles a day while pushing or pulling a heavy cart. Since AMRs do the walking for the humans and safely transport material from their human coworkers to the next destination in the warehouse, worker walking distance decreases nearly 50%.

Another benefit of AMRs for P2G automation is that the number of robots can be easily scaled up and down using a robots-as-a-service (RaaS) model as dictated by the warehouse's order volumes. For example, during busy peak season, you can bring in more robots to work alongside your human associ-

ates to meet and improve your productivity numbers.

Before opting for a P2G or fixed automation solution, you should consider your unique requirements and select the right option to suit their particular needs. When you do so, you'll find that the answer for today's flexible and scalable warehouses — both large and small — is clear: P2G automation is safer for your associates; easier to implement in your greenfield or brownfield warehouse; and increases productivity.

Voice Picking on the Horizon

The future is audible in the realm of warehousing with voice-directed warehousing (VDW). Solutions like Lucas are leading this revolution, providing workers with precise voice prompts. This hands-free system seamlessly guides them, ensuring accuracy in every order.

What's the Right Box?

Robust automation systems can generate the appropriate box size for the inventory that's being picked. In a lot of cases, they can also pre-generate the outbound shipping label, so the warehouse picker can put the item(s) into the shipping container, affix the shipping label to it, and send it on its way via a belt or conveyor without having to go through a multiple touch packing process.

Maximizing Space with Mezzanines

When horizontal expansion isn't viable, the answer is to ascend. Mezzanines and pick towers offer a solution for warehouses looking to maximize their space. Sophisticated systems like Locus's picking and passing optimize operations across multiple floors, eliminating traditional hurdles and significantly boosting efficiency.

Your warehouse automation solution should be able to pick and pass on multiple floors, with the ones past the first floor being called the "mezzanine" level. For example, if your first unit is on the top floor and the second unit is on the ground floor, your automation solution should be able to pick the item into the container on the top floor and pass the container down to the bottom floor to get that second unit. The alternatives are very messy for mezzanines if you don't pick and pass from level to level.

Enhancing Worker Experience

The beauty of automation doesn't just lie in increased efficiency; it significantly improves the workers' quality of life. Automated processes, especially when integrated with AMRs, reduce physical strain, fostering a happier and more energetic workforce.

Additionally, solutions with gamification platforms introduce a lively competitive edge, ensuring workers remain motivated and engaged. The innovative

interface, coupled with real-time feedback, fosters an environment where performance is celebrated. Gamification gives employees a clear understanding of their goals as they work, using the on-screen display. They're able to see the results of their work in real-time helping to encourage higher levels of productivity, teamwork, and overall involvement.

The future of warehousing, with its blend of technology and human expertise, promises unparalleled efficiency and precision. Automated picking stands at the forefront of this evolution. As warehouses around the world embrace these innovative solutions, the stage is set for a future where every pick is a step towards perfection.

Chapter 5 Action Items Recap

What's your best automation strategy for picking and how can you decide? Automate wisely by considering the unique needs of your warehouse.

Fixed Automation (G2P):

- Comprises conveyors and shuttle systems.
- Offers ease but lacks flexibility.
- Implementation can disrupt operations and takes 12-24 months.

Person-to-Goods (P2G):

- Involves autonomous mobile robots (AMRs).
- Offers quick implementation (4 weeks) without disturbing existing setups.
- AMRs decrease worker walking distance by 50%.
- AMRs scale easily with Robots-as-a-Service (RaaS) to meet fluctuating demands.

Explore Emerging Technologies:

- Voice-Directed Warehousing (VDW): Incorporate solutions like Lucas to guide workers via voice.
- Automated Packing: Use systems that choose appropriate box sizes and pre-generate outbound shipping labels.

Optimize Space:

- Implement mezzanines for vertical expansion.

Enhance Worker Experience:

- Incorporate AMRs to reduce physical strain.
- Leverage gamification for motivation and real-time feedback.

Automate wisely by considering the unique needs of your warehouse. Aim for a harmonious blend of technology and human expertise for peak picking efficiency.



Chapter 6

How to Automate Packing

Imagine standing atop a tower, watching a river flow smoothly below, only to suddenly see it overflow onto the banks thanks to a storm, creating chaos. That's what it's like when you automate your warehouse's picking system without considering the potential backlog you could create at the packing stations. To truly harness the power of automation, one must look beyond just one process. And so, let's go from picking to the next process you need to operate efficiently: packing.

How it Works

Picture this: A pair of freshly picked shoes and a stylish shirt ready to be shipped out. But before they can be sent off to their new home, they must be safely housed in a carton, sealed, and dispatched on a truck. With autonomous mobile robots (AMRs), pre-addressed labels, the right carton, and human associates as part of your picking process, packing

becomes a breeze. The shoes and shirt are picked directly by a human into a carton, already sporting a mailing label, perched atop an AMR. A simple seal later, and they're whisked away to a truck, ready to meet their new owner.

Multi-Level Movement

For packing, multi-level conveyance solutions are a solid way to automate your warehouse. With these conveyors, one level would consist of your in feed from one area; the next level would be in feed from a separate area; and then the top could be taken away to your trucks for shipping or outbound.

Along with multi-level conveyance solutions, you could also have a series of chutes from an above level to the packing station level that act like elevators for the orders. These chute sorters would be used to send each item in an order down the chute. At the bottom of the chute, a box that's right-sized to the order would be sitting on a Locus Vector or other mode of transport, and the items would fall into that box. Once all items were down the chute, Vector would bring the box over to a packing associate to avoid the need for another conveyor.

What's in the Box (or Bag)?

Like any process, both manual and automated, there are nuances to consider in your packing efficiency. The size of an order often dictates the automation

required. Enter Packsize, a leader in crafting perfectly sized cartons. From tiny trinkets to larger treasures, Packsize ensures that every item finds its perfect box including the typical shipping box known as the Regular Spotted Container (RSC). With Packsize's software, users have the ability to split orders if an order doesn't fit in the largest box and to prioritize one box over the other due to the timing in the order pool.

Its sophisticated cubing software determines the appropriately sized carton from a list of a few hundred box sizes for an order, which could be anywhere from extra small to large. Once the carton is built, the associate prints and applies a shipping label to the box and places it on a LocusBot, which goes to the picking station for the item(s). Once the order has been picked, a LocusBot takes the carton over to a pack station. The carton is placed on a conveyor for an automated sealing and taping device, and it's ready for shipping. Automating these steps minimizes the touches in the packing stations.

Cube-IQ also offers wisdom in load planning and optimization, guiding users to the right carton selection.

But packing automation doesn't stop with boxes. For eCommerce, with its unique demands, auto baggers at each packing station make sense. LocusBots can take a bunch of items from each picking, and those orders are inducted by a human associate into a simple conveyor that feeds an auto bagger. The machine scans the barcode or item, drops the item into a bag;

seals the bag; and then prints and applies shipping labels on that package.

Must-Have Packing Accessories

Dunnage, often overlooked in a warehouse, plays a vital supporting role in the packing process to make sure nothing breaks in transport. From air pillows (from Grainger and others) that cushion the order to crumpled paper that fills voids, every piece ensures that products reach their destination in pristine condition.

And let's not forget the way packages stay in their box: paper tape machines like Carton Sealers from Best-Pack and case sealing machines from Packaging Tape Depot. These technologies can be programmed by the box sizes you use in your warehouse and labeled, so when you have a box, you hit a button and the perfect amount of tape comes out. That brings in a little bit of labor savings timewise, but the bigger thing is consistency with the image of your outbound package. At the same time, you'll consume a bit less tape because there's less error using an automated tape machine.

To sum it all up, automating the packing process isn't about introducing technology to replace human touchpoints. It's about bringing together manual and automated processes to maximize efficiency and accuracy, ensuring every product reaches its destination in the best condition possible. As we've seen, from the multi-layered conveyance systems to

sophisticated carton-sizing software and critical packing accessories, every step and component plays a crucial role. But remember, while technology propels us forward, it's the strategic integration of these elements that truly elevates the packing process.

Chapter 6 Action Items Recap

- **Evaluate your current system:** Before integrating any automation, assess where your current inefficiencies lie.
- **Research AMRs:** Consider if AMRs like Locus-Bots could be beneficial in your packing process.
- **Consult with packaging experts:** Connect with companies like Packsize and Cube-IQ to better understand how their solutions could fit your needs.
- **Optimize for eCommerce:** If a significant portion of your business is eCommerce, seriously consider auto baggers and other specific solutions for this market.
- **Invest in quality packing accessories:** Prioritize the protection of your products with good dunnage and reliable sealing methods.
- **Review and optimize regularly:** The world of warehouse automation is ever evolving. Regularly revisit your processes and make adjustments as needed.



Chapter 7

How to Automate Shipping

With fluctuating order volumes and customers wanting their orders the next day, the shipping process can make or break your warehouse operations. With transportation costs soaring, it's vital to explore automation avenues that not only optimize costs but also increase efficiency. Dive in to explore the technology behind the automated shipping process.

The Rise of Multiple Carriers

The demand for diverse shipping options is increasing. Gone are the days when one carrier ruled the roost. To stay competitive, warehouses could be utilizing up to 10 different carriers from FedEx to UPS to third-party options like truck-to-truck shipping. The challenge for warehouses and fulfillment centers becomes how to streamline carton sortation with the array of shipping vendors.

Warehouse automation can help this shipping chaos by having autonomous mobile robots (AMRs) sort to the right place and then have a larger AMR like Locus Vector take all the packages that are being shipped through FedEx, for example, to that specific truck or to the correct door.

Zone-Wise Efficiency

When dealing with multiple transportation options, including anywhere from ground to air shipping, you want to save money in your shipping costs. One way to do so is to pick by zone, which entails sorting down to a zip code or at least one zone of a country. By sorting packages based on zip codes or specific zones, warehouses can significantly slash shipping costs.

Sort Items to the Right Spot

The traditional way to automate sortation is to place items on a conveyor that goes to the pack-up sorters. However, the holy grail of automation for shipping is the palletization of multi-carton orders. Robots like AMRs can be used for palletizing orders that are alike, but that's tougher to do with pallets of mixed orders, as softer items could be crushed on the bottom before they get to the trucks.

Load Trucks with Ease

For retail warehouses, typically they're loading pallets onto a truck and could use Gideon Brothers' autonomous forklift. For other warehouses, they're loading boxes to fill the truck, which is a manual process, but there's another way.

Imagine a device that can load a truck in five minutes. Auto truck loaders, which are forklift trucks that can auto load a truck or conveyor, do just that. Deposit items on the dock, activate the loader, and voila, within five minutes, your truck is ready to roll. But consistency is key – your load needs to be stable for this automation to work efficiently.

No More Bending and Lifting

Hopefully, you've never had a repetitive stress injury (RSI), but they're prevalent in the warehouse world from workers bending and lifting material all day. Restuff-it™, by Gorbels, takes packages that are ready to go out and conveys them onto the truck trailer. In loading mode, the ergonomic benefits of the Restuff-it are realized by using the operator platform to lift the worker to the proper position relative to the box wall instead of making the associate bend up and down to load the truck. In addition to this ergonomic benefit, many users also realize an increase in cube utilization by increasing accessibility to the top of the container.

Speaking of ergonomic benefits, pallet wrappers, like stretch wrap machines from Uline, are a form of warehouse automation that can help with ergonomics and worker safety. With a pallet wrapper, carts are dropped onto a pallet; the warehouse associate pulls the trigger; and the pallet is automatically wrapped. These solutions can be expensive, but they are great for ergonomics as workers don't have to bend down as much to wrap the pallet.

Stop Manual Warehouse Management Systems

Old processes of tracking everything on paper or Excel spreadsheets don't work anymore and certainly aren't time efficient. If you don't already have one, you need a computerized Warehouse Management System (WMS). It's not just a fancy tool. Instead, you'll find it to be a lifesaver as it has capabilities that you can leverage to help with shipping and every part of your warehouse operations.

One way: Look at your shipping service level agreements (SLAs) because different types of products may require different shipping priorities. If a customer has ordered two items and one requires two-day shipping and the other requires regular ground, they're both going to be shipped out as two-day, even though the second item doesn't need to be. There are levels within a WMS that allow you to split those orders, or list them separately by shipping priority. If you're looking to minimize

freight shipping costs, doing this is an option to prevent unnecessary expedited shipping and save significant costs.

RFID Tags: Not Just a Buzzword

RFID tags have reinvented the checkout process as orders leave your warehouse. Embed these tags in your pallets within your label stock, and overhead scanners above your dock doors will note the RFID tag and process it as being on the truck and out the door.

RFID tags can also be used for warehouse yard management systems. In huge yards, you can place RFID tags on your trailers, which helps with trailer management. For example, 3PLs use a number of different carriers and when DHL shows up, they need a DHL trailer. You can use the RFID tags to find the DHL trailer that's available, which helps with lot management and tracking. Yard management systems and RFID tags typically reduce the cycle times of getting trucks to and from the doors. Instead, it's task oriented as they know that they're in one parking location and need to be at an exact door.

In the age of automation, shipping is a domain ripe for innovation. From AMRs to RFID tags, the tools are in our hands. By smartly integrating these elements, warehouses can enhance efficiency, cut costs, and guarantee that every package reaches its destination promptly. Remember, the future of shipping is automated — are you on board?

Chapter 7 Action Items Recap

Review Your Carriers:

- Assess if diversifying carriers can benefit your shipping costs and times.

Explore Automation Tools:

- Consider integrating AMRs into your shipping process.

Implement Zone-based Sorting:

- Re-evaluate your sortation process to incorporate zone-wise efficiency.

Consider Robotic Assistance:

- Look into robots and other autonomous devices for palletization and truck loading.

Prioritize Ergonomics:

- Assess tools like Restuff-it™ and pallet wrappers to improve worker safety.

Upgrade Your WMS:

- Check if your current Warehouse Management System meets your needs, especially regarding shipping SLAs.

Embrace RFID Technology:

- Evaluate the use of RFID tags for both the checkout process and yard management.

Remember, while automation can significantly boost efficiency and reduce costs, it's essential to ensure that any changes align with your warehouse's unique needs and constraints. With a strategic approach, you can automate shipping and elevate your warehouse operations to the next level.



Chapter 8

Top Questions to Ask When Choosing an AMR: A Checklist

When selecting an autonomous mobile robot (AMR) solution, there are many factors to

consider in choosing the right one. Here are some key questions you should ask yourself and the vendors you're evaluating to find the right AMR for your warehouse.

Your Warehouse

- Are your warehouse operations inbound-focused? Outbound-focused? Or both? Your decisions should be centered around that design point.
- What is the physical size of the products you have in your warehouse? If you're dealing with large items, and lots of cases or pallets, you might lean towards an automated storage

and retrieval system (AS/RS) or a huge shuttle system. If your items are small (like Band-Aids or contact lenses), you can do away with putwalls and instead focus on speed to order and organization.

Compatibility

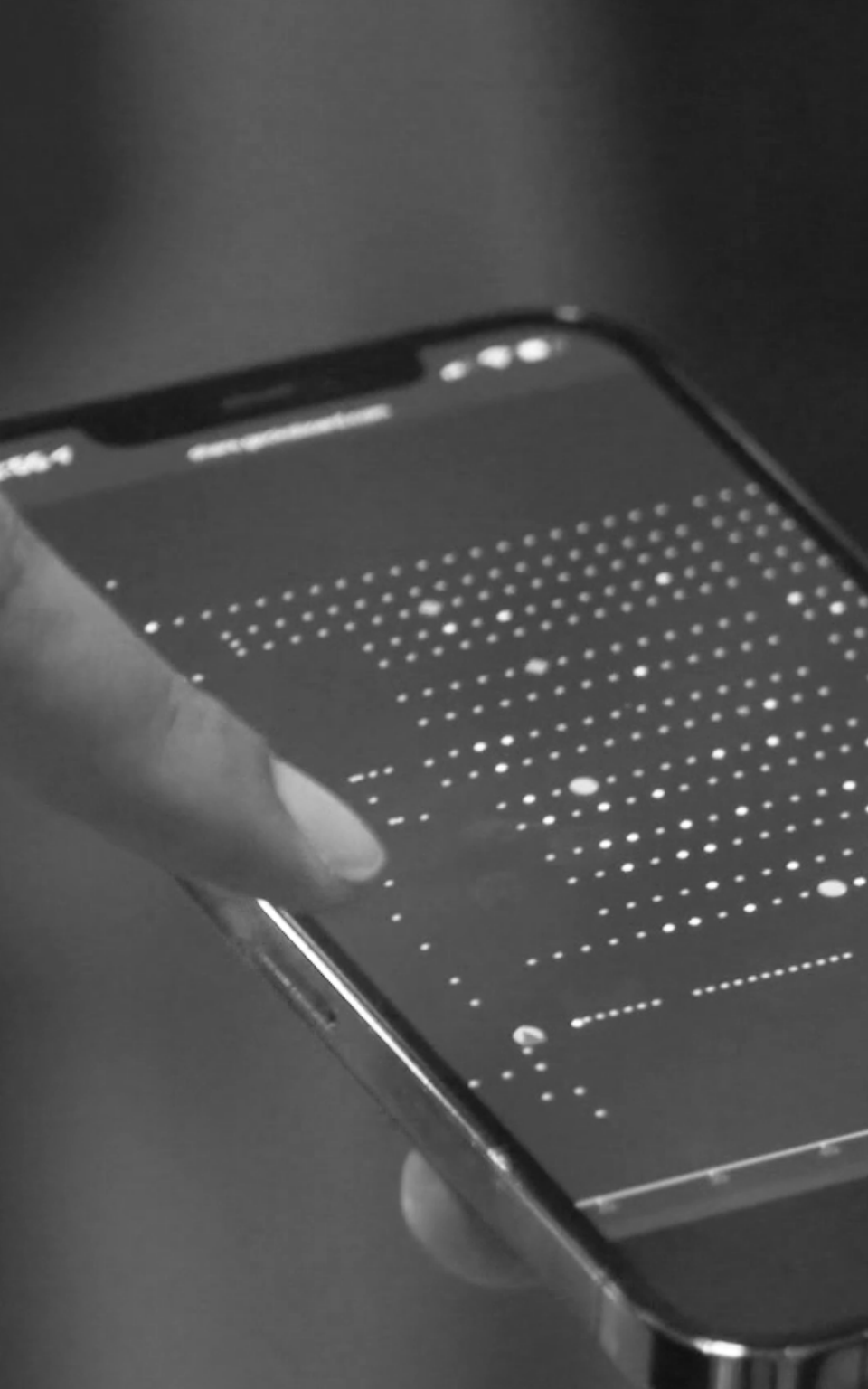
- What are you putting on the AMR? Think about what will be carried by the robot and if that matches the envelope (dimensions) of the robot and the weight capacity.
- Can the robot run on your warehouse surface? For example, if you have plywood decking, the AMR needs to be able to drive over that surface.
- What are the charger power requirements? Consider where the chargers will be located, and if charging management is automatic, which it should be.
- What temperature is your warehouse? Can the robot handle that temperature? This is important if you have a refrigerator environment.
- Can the AMR work with and adapt to other use cases that your warehouse might have in the future? For example, Brownfield and Greenfield; Single-Level Discrete Pick; Single-Level Batch Pick; Multi-Level Batch Pick to Downstream Sortation; Multi-Level Discrete Pick-and-Pass; and Omnichannel.

Maneuverability

- Can the AMRs navigate your building effectively? Consider if there are blockades that don't allow for AMRs to travel around your building.
- Are your aisle widths large enough to allow two AMRs to pass by each other, or turn around in the aisle? Check the width of your aisles and compare that to the size of the AMRs.
- Can your warehouse support your entire AMR fleet? Consider areas that might lead to congestion due to workflow.

User Interface

- Is it visual and simple to use? The AMR should provide the information that's needed by the user to perform their job in an easy and effective manner.
- What are the training requirements? Consider the amount of time it will take to train the user; if there are multilingual users; and any authentication/login process.



Chapter 9

Business Intelligence and Warehouse Automation: The Winning Combination

With artificial intelligence (AI) and digitalization all over the news (you can't turn without hearing the term "AI"), the synergy between Business Intelligence (BI) and warehouse automation is even more important and is reshaping how businesses operate their warehouses. This dynamic duo not only streamlines operations but ensures you get the most out of every process, every worker, and every pallet.

Unlock the Potential of ERP Systems

The magic begins with your Enterprise Resource Planning (ERP) system. This handy tool dives deep into your inbound inventories, guiding you on how best to distribute items across aisles. During this evaluation, you can come up with inbound optimiza-

tion tools that help with not only scheduling where your loads go but placing them more intentionally because your putaway time will be shorter once the material is on the dock.

The Power of Data Visualization

Business intelligence is more than just about sorting things out. It also gives you a panoramic view of your warehouse operations in ways you've never seen before. Through dashboards, reports, and real-time analytics, you gain unprecedented visibility into your warehouse activities. However, remember that this data is only as good as its interpretation. It's not just about seeing what's happening but understanding and acting on it. Whether it's reallocating resources or redirecting labor, BI empowers you to make informed decisions.

Continuous Improvement with Automation

While automation is a game-changer, its real value emerges when coupled with continuous feedback. By actively learning and adapting from the data churned out from your dashboards, your warehouse operations are always on an upward trajectory.

A New Perspective on Inbound Systems

One thing that's often overlooked with inbound systems is that, typically, you put things on a pallet and then you take those to putaway. With business

intelligence and warehouse automation, however, you can look at the truck level, when it's on the dock, and when you print out labels to see if items coming in are grouped close together. In that process, you can put sort codes on it, so you're building your putaway batch pallets before the items are even there.

When you look at incoming material this way, you can put orders together that have similar pick paths to minimize your travel. You can also do the same thing with putaway if two items are going to the same aisle or bay for example. Those items can be transported in the same pallet because it's one travel path instead of one item being for aisle one and the other being aisle 50, which would be wasted travel time.

Redefining Warehouse Navigation with LocusOne

Enter LocusOne – an innovative solution that reshapes how you view your warehouse. It transforms your perspective, encouraging you to see your warehouse as a network of roads. Just like city planners ensure efficient traffic flow, LocusOne helps you strategize the best routes almost like a road system, minimize travel, and rethink your storage areas. You'll see an efficient travel route to get through and because you're driving productivity, you start thinking about cut throughs, for example. It's not just about where items go; it's about the journeys that the items take along with your associates and LocusBots.

Rethinking Operations with AMRs

The inclusion of Autonomous Mobile Robots (AMRs) is a game-changer. By constantly collecting data like pick times and load times, AMRs provide an opportunity to reevaluate and refine your warehouse operations. Ultimately, it's about prioritizing what's crucial – whether it's time, cost, or quality. Business intelligence, combined with automation, ensures you excel in the areas most important to your customers.

In the end, the integration of Business Intelligence and warehouse automation is not just about innovation; it's about reinvention. It pushes you to reconsider every facet of your operations, ensuring that every move, every decision, is a step towards unparalleled efficiency and customer satisfaction. So, are you ready to take your warehouse to the next level?

Chapter 9 Action Items Recap

- **Evaluate Your Current Systems:** Check if your ERP system is fully optimized for inbound inventories.
- **Harness the Power of BI:** Regularly review BI dashboards and reports, ensuring you interpret the data effectively to make informed decisions.
- **Iterate and Improve:** Utilize feedback from your automation systems to constantly refine your operations.
- **Re-evaluate Inbound Systems:** Explore ways to integrate BI and automation to improve putaway practices.
- **Engage with LocusOne:** Consider how LocusOne might fit into your operations to optimize routes and storage strategies.
- **Incorporate AMRs:** Research the benefits of integrating AMRs into your warehouse to capture real-time data for process refinement.
- **Stay Updated:** As technology advances, regularly update and reinvent your operations to ensure continued efficiency and customer satisfaction.

By proactively implementing these insights and action items, you'll be on your way to harnessing the full potential of BI and automation in your warehouse operations.



Chapter 10

The Future is Now: Embrace Warehouse Automation

As we reach the final pages of this guide, it's time to reflect on the journey we've taken and the insights we've gained. From receiving to shipping, every step of the warehouse process has been illuminated, showcasing how automation can reshape operations.

Change is Here for Your Warehouse

Warehousing stands at a pivotal moment. While many facilities still rely on legacy, manual processes, the landscape is shifting. From labor challenges to changing customer expectations, it's clear that the future lies in adopting strategic automation.

By exploring various technologies like AMRs, conveyor systems, and sophisticated software, we've seen how automation enhances productivity, accuracy, and safety. However, simply adopting technology isn't enough. Success lies in understanding your unique

constraints and integrating the right solutions in a way that aligns with your needs.

The Pillars of an Automated Warehouse

Certain foundational principles shine through. First, take a holistic view, ensuring changes translate to end-to-end efficiency gains. Second, center decisions around your people, creating solutions that assist and empower your workforce. Third, stay nimble, enabling your operations to flex and scale as demands fluctuate. Finally, keep improving through iterated enhancements fueled by insights from BI and your automation systems.

Looking Forward

The automated warehouse of tomorrow promises unrivaled speed, precision, and productivity. But more importantly, it prioritizes your associates' wellbeing through reduced strain and safer environments. It leverages human skill alongside technological innovation to elevate output and morale.

By embarking on this automation journey today, you ready your warehouse not just for present challenges but future opportunities. As consumer needs evolve and capabilities expand, your operations will remain resilient, responsive, and revolutionary.

The future beckons us all toward automation. You're ready now that you've read this guide – now it's time to take action and contact us.

Thank You

Thanks to the subject matter experts that were interviewed for this book.

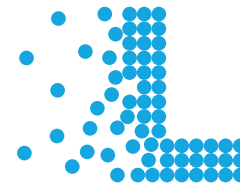
From Locus Robotics: Neil Bentley; Steve Branch; Dan Coote; Eric Figlioimeni; Jason Gies; Patrick Hussey; Mike Johnson; Sean Johnson; Harsh Kulkani; JP Lichtenberg; Tim McCabe; Kaitlin Peterson; Erik Pichette; Jason Pokorny; Steve Simmerman; Melissa Valentine; Jason Walker; Andrew Wang; Julian Ware.

From ThruPut Partners: CEO Brian Hudock and Project Executive Kevin Hume.

From New Course Group: CEO and Managing Principal John Sidell.

About the Author

Mary E. Hart is the Senior Content Marketing Manager at Locus Robotics. She is an author, writer, and speaker with over two decades of experience in the B2B technology industry.



L O C U S

About Locus Robotics

Locus Robotics is the market leader in Autonomous Mobile Robots (AMR) for fulfillment warehouses. Locus is the leading warehouse robotics choice for retailers and third-party logistics (3PL) operators, industrial/automotive, and healthcare companies worldwide looking to meet – and solve – the increasing demands of the booming and dynamic e-commerce and fulfillment market.



Visit us

www.locusrobotics.com



Email us

US: info@locusrobotics.com

EU: emea@locusrobotics.com