

Understanding **Warehouse** Optimization

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Understanding Warehouse Optimization

Warehouse optimization has historically been a challenge for businesses since it is impacted by a host of external forces including partner relationships, logistics, technology and the state of the global economy.

Modernization and the acceleration of the transition to a digital economy has brought new additional challenges, too.

That rapid expansion of e-commerce, along with the emergence of multi-channel and omni-channel distribution systems, requires a different approach to warehouse management. Other factors such as the globalization of supply chain networks, the growing popularity of micro-fulfillment centers, and the rise of autonomous mobile robots along with increased demand for same-day and next-day delivery is pushing warehouse management in new directions.

Amazon also has had a profound effect on how warehousing is done. The company has been an early proponent of automation, which is pushing the industry to adopt similar techniques or fall behind. Amazon Robotics has automated the e-commerce giant's fulfillment centers with more than 100,000 autonomous mobile robots, according to ResearchandMarkets.com. That number is up by more than 300 percent since 2015.

These trends have propelled the use of increasingly sophisticated automation to meet the changing warehouse landscape. Warehouse Optimization is widely considered the way forward, which is why Warehouse Optimization spending will more than double over the next few years, according to ResearchandMarkets.com forecasts, accounting for an annual \$27 billion in spending by 2025.

This guide serves as an introduction for understanding Warehouse Optimization, and both how and where businesses should be using it today for more efficient warehouse management.



The **Six Elements** of Warehouse Optimization

Warehouse Optimization typically consists of six key elements.

1. Automated mobile data collection

Automation helps increase inventory data accuracy and productivity by eliminating tedious manual capture and input processes. The Internet of Things (IOT) is finding its way within the warehouse as well.

2. Inventory management systems (IMS)

Comprehensive software offers better inventory control as well as real-time visibility of stock levels, storage locations and product information.

3. Warehouse management systems (WMS)

WMS solutions provide direct receiving, putaway, picking, packing, shipping and space utilization information along optimized routes. This streamlines and accelerates all of these important warehousing tasks.

4. Automated storage and retrieval systems

These can include cranes, enabling stock to be stacked vertically for higher storage densities and improved space utilization. Conveyors and automated vertical carousels may also be used to move stock and improve space optimization.

5. Industrial robots

Robots are increasingly being used for palletizing, de-palletizing, packaging, commissioning and order pickup. They are also capable of identifying and tracking containers using barcodes and RFID tags.

6. Network connected data terminals

These terminals are usually handheld or truck mounted and use radio to connect to logistics automation software. They provide instructions to operators moving throughout the warehouse and often have barcode scanners to enable identification of containers quickly and accurately.

The **Benefits** of Warehouse Optimization

Global supply chains are expanding and evolving at a breakneck pace. Omni-channel e-commerce and distribution coupled with consumer demand for faster and more efficient service were already transforming the industry. The COVID-19 pandemic has sped up that transformation, placing massive demands on warehouse management during a historically difficult period.

The time for Warehouse Optimization has already arrived, and the myriad reasons for automating warehouses are compelling.

Efficiency Gains through Improved Performance

Business process automation streamlines manual tasks like inventory data collection for integration with a larger enterprise resource planning system. Artificial intelligence and automation are used to input and track data, which is then stored for later reporting and analytics.

Streamlining a variety of tasks improves efficiencies as well as overall warehouse performance, not to mention reduces errors inherent with manual processes.

Physical automation technologies include everything from autonomous mobile robots (AMRs) to driverless automated guided vehicles (AGVs) to automated storage and retrieval systems (ASRs). Each type of automation offers a host of efficiency gains while vastly improving warehouse performance.

Increased Worker Productivity and Reduced Turnover

Warehouses have alarmingly high employee turnover rates, which average roughly 36 percent, according to the U.S. Bureau of Labor Statistics. Automation eliminates many mundane and repetitive manual tasks, both from a business process and physical labor standpoint. This frees up workers to focus on more challenging tasks, which helps with job satisfaction and overall retention.

Not only are workers more engaged and satisfied after automation, they also are able to focus on core business initiatives, planning and growth strategies. Automation makes tasks easier and safer, which boosts overall productivity without the need to raise headcount.

The **Benefits** of Warehouse Optimization

Reduced Operating Expenses

Warehouse Optimization solutions offer a return on investment within months, making them an attractive investment for businesses of all sizes. And because of increased productivity and efficiencies, automation helps reduce overhead while increasing throughput.

Automating business and physical processes helps lower costs for labor, equipment, maintenance and management. Workers are also responsible for less manual entry and processes, which means there will be significantly less chance for errors. That leads to major cost savings.

Finally, automation can help lower regular operating expenses including energy consumption, the amount of storage space required and money spent on safety incidents.

Improved Customer and Partner Experiences

By streamlining operations throughout all aspects of the warehouse, there are less opportunities for error—and this leads to happier customers and business partners. Inventory moves faster and more accurately, and customers and partners reap the benefits of a better overall experience.

That improved customer satisfaction boosts both sales and brand. Warehouse Optimization not only improves operations today, it prepares businesses for an increasingly competitive landscape with very little room for error and inefficiency.



The **Benefits** of Warehouse Optimization

Better Inventory Management

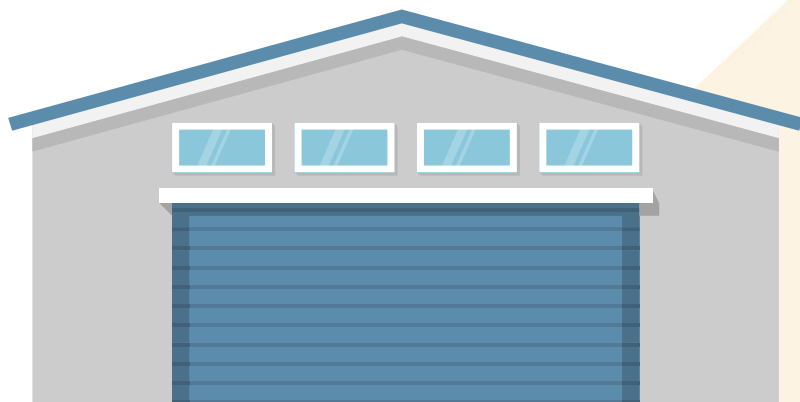
Warehouse Optimization doesn't just streamline inventory and warehouse operations. It helps create a healthier inventory by reducing lost products, shrinkage and misplacement. Businesses have a granular level of management when it comes to inventory control, which translates to fewer fulfillment and shipping errors.

Automation solutions can also help coordinate the usage of material handling equipment like barcode scanners and mobile devices. This further improves efficiencies and helps contribute to tighter inventory control. That also means businesses can reduce or eliminate staging in support of just-in-time methodologies for order fulfillment, creating even more efficiencies.

Reduced Environmental Footprint

Warehouse Optimization is better for the environment, too. It helps reduce energy usage and costs while also lowering the amount of waste generated. Better planning and streamlined processes can also reduce the amount of land used, since warehouses will maximize the use of space better.

Businesses that deal with temperature-controlled buildings or require refrigeration will realize exceptional benefits from automation, too, as well as those that deal with hazardous waste.



How to **Know if You Need** Warehouse Optimization



Most businesses know that automation improves efficiency and reduces overall costs. This is no less true for Warehouse Optimization. But as with the adoption of any technology, there's a cost in terms of time and capital investment. So when is the right time to automate a warehouse?

While there's no single criterion to guide the way, there are five common signs that strongly imply a business is ready for Warehouse Optimization.

1. Current Processes Take Up Too Much Time and Manpower

Warehouse workers can only get so much done in an allotted shift. If processes at a warehouse are taking up too much time, and using too many man hours, it's probably time to make the switch to automation.

Not only are automated systems faster and more accurate than manual labor, they guarantee efficiency. And once workers are freed from repetitive and time-consuming manual processes, they can focus on higher-level business processes that drive greater business value.

2. Inventory Levels and Order Fulfillment are Inaccurate

If a business is struggling to maintain accurate inventory levels, it is time to automate through the use of a warehouse management system. These systems maintain complete and accurate control over all inventory, regardless of whether a product is seasonal or ongoing.

Automated systems also ensure orders are fulfilled correctly, and they reduce product damage; since workers don't need to manually move products as much, there's less likelihood of damaged or misplaced products. That also means that workers benefit from a safer working environment with a decreased amount of physical labor. Automated systems handle everything from picking to lifting and moving heavy loads in all kinds of temperatures and environments.

How to **Know if You Need** Warehouse Optimization



3. Customers are Not Satisfied

If customers are routinely unhappy with fulfilment, this is a flag that a business should be investing in Warehouse Optimization and optimization.

Warehouse Optimization streamlines processes and enables orders to be picked, fulfilled and shipped more efficiently and accurately than manual processes.

4. Difficulty Getting Orders Out on Time

If a business is struggling to get orders out on time, automation might be the solution. Warehouse Optimization sets up efficient picking processes, routes and sequences to improve overall management and performance within the warehouse.

Automation also eliminates the process of staged orders sitting around waiting to be picked up. Through automation, businesses can implement just-in-time order fulfillment, preparing orders on the fly when the delivery vehicle arrives on site. This frees up warehouse space, keeps inventory flowing smoothly, and ensures orders are sent on their way in the most timely manner possible.

5. Legacy Systems Require Too Much Upkeep

If a business is using outdated technologies to manage warehouse processes, chances are strong they're not providing the business with optimal efficiency. Legacy solutions also typically require more maintenance and support to continue running.

Most automation solutions now offer scalability and relatively easy setup and stay updated because they are based on cloud technologies the self-update.

The **Two Sides** of Warehouse Optimization

Warehouse Optimization consists of two main components: process automation, and physical automation. Both are designed to improve operations and procedures within a warehouse beyond the capabilities of human workers through the integration of artificial intelligence and robotics. Each type of component takes over a repetitive or time-consuming task, enabling workers to focus on more challenging jobs.

Warehouse Optimization solutions don't always encompass both types of automation, and both aren't necessary to realize business improvements and efficiencies; both process automation and physical automation can be deployed separately, each delivering efficiencies. But taken together, they represent the forefront of efficient warehouse management. Businesses may choose to utilize one or both forms of Warehouse Optimization, depending on their needs.

Process Automation

Also known as system automation, process automation digitizes and automates a variety of manual processes. These may include inventory data collection, which is then integrated into a software environment like an enterprise resource planning system or database. Barcoding and wireless barcode scanners are typically used to input and track data, which is then sent to a central repository through the software system and stored. It may then be easily accessed in the future.

Process automation solutions are beneficial for businesses of all sizes. They streamline operations, enabling greater efficiencies, improved accuracy and ultimately a better customer experience. Offerings are typically scalable, and they are easily integrated with existing business process solutions.

Physical Automation

Physical automation includes robotic systems and other forms of mechanical automation. When most business leaders think of Warehouse Optimization, this second type is likely what comes to mind first.

Physical automation is suitable for larger warehouses and distribution centers handling high volumes of inventory. It is typically more costly to implement than process automation, but it offers a good return on investment.

Physical automation may include everything from autonomous mobile robots (AMRs) to goods-to-person (GTP) technologies along with driverless automated guided vehicles (AGVs). An automated storage and retrieval system (ASRS) is one of the most powerful and expensive examples of physical automation, used by Amazon to stay on top of its speedy shipping promises.

The Warehouse Optimization Market is Approaching \$27 Billion

The global Warehouse Optimization market should reach \$27 billion by 2025, according to ResearchandMarkets.com. The market for AGVs and AMRs alone will surpass \$4 billion, and these robots are expected to capture more than 15 percent of the overall Warehouse Optimization spend. When combined with picking robots, this group will make up more than 40 percent of total Warehouse Optimization spend.



Choosing the **Right Type** of Warehouse Optimization

Businesses that want to keep costs down, streamline operations, achieve growth and improve the customer experience will benefit from some type of Warehouse Optimization. It isn't usually a question of if a firm should use Warehouse Optimization, but rather what type and how much.

While there's no one right answer to this question, the right answer for a given business often comes down to company size.

Process automation solutions are effective for businesses of all sizes, include small to medium-sized organizations. At a minimum, process automation enables more accurate order fulfillment as well as lower operating costs. Process automation solutions also typically improve margins, reduce delivery times, cut down on manual errors and help increase customer satisfaction.

Larger businesses with greater warehouse operations, on the other hand, are a likely candidate for using both process automation and physical automation. For businesses that can afford both, the introduction of robotics increases picking speeds and volumes while simultaneously decreasing picking errors.

So small and medium-sized businesses should look primarily toward process automation. Larger businesses or those with particularly high-volume turnover might also want to include physical automation.





Getting Started with Process Automation

Because process automation is both affordable and widely applicable to all types of warehouse operations, focusing on this type of automation makes a good entry point for automating a warehouse.

When getting started with process automation, there are three major components to consider: data collection automation, inventory automation, and overall warehouse management automation. The most basic is data collection automation, and the most complete is process automation that includes all three components.



Automating Data Collection

Data collection automation is the starting point and the most basic step for Warehouse Optimization efforts.

The goal of data collection automation is moving from manual data entry into a spreadsheet or database to automatically adding warehouse data into an enterprise resource planning system (ERP). This automation cuts down on staff time and reduces human error.

Without automation, for instance, an employee in receiving must key in important numbers like SKUs or other product codes and quantities. Products are then stored in corresponding areas of the warehouse. But the potential for recording a wrong number is great, which can derail the process of storing, retrieving, packing and shipping the improperly logged item. In the worst-case scenario, a customer will receive an incorrect item or the item will be listed as out of stock when there is actually sufficient inventory.

With automated data collection, accurate data is maintained and many of the issues that typically hinder warehouse efficiency are significantly limited.



Mobile Scanners Linked to a System of Record

The two elements that automate data collection are mobile scanners and a linkage that automatically moves scanned data to a centralized ERP system.

Because keying in items and quantities is inherently inefficient and error-prone, most warehouses already use barcodes and some form of mobile scanners for tracking items within the warehouse. The missing element for many businesses is widespread adoption of mobile scanners along all parts of warehouse operation, and moving the data into a centralized system automatically without manually importing data from these scanners and their separate systems.

In other words, more scanners, more scanning, and more automatic capture of the data from these scans.

This can be accomplished by fitting smartphones and tablets with affordable barcode scanners and making them the starting point for all employee interaction with physical goods in the warehouse. Anything having to do with a physical good starts with the scan of a barcode from the employee's personal device, much like FedEx and freight operators such as UPS scan each package when it goes on a truck, and again when it is delivered to a customer.

Since smartphones and tablets can be connected to a warehouse Wi-Fi network, data from the devices can flow automatically and instantly from the device to the facility's warehouse management system for real-time visibility and always-accurate data collection.

Specialized warehouse management software on the mobile devices also makes the scanning process more efficient, reducing the steps during scanning.

Radio Frequency Identification Tags (RFID)

Where possible, radio frequency identification tags (RFIDs) can further improve the automated data collection process by eliminating the scanning step in many cases.

An RFID device is an inexpensive physical tag that automatically reports its unique ID through WiFi, Bluetooth or other radio communications method. This can allow employees and machinery to identify individual items or lots without a scanner by having the item identify itself through the signal from its RFID tag.

While RFID technology is not appropriate for every warehouse situation, it should play a starring role where possible because it enables data automation with even less physical interaction.

For most warehouses, RFID tags will mix with handheld scanning to capture the complete picture of what is going on in a warehouse.

Data Quality is Key for Automation

The utility of Warehouse Optimization largely rests of accurate data collection and validation. If warehouses are not accurately tracking all items that move in and out of the warehouse, automation and inventory control break down fast.

Target, a large U.S. retailer, notes that the three largest errors caused by a lack of data validation include listing the wrong products, listing inaccurate product attributes and duplicate listings or content.

This is part of why overstocks and returns cost retailers a whopping \$1.75 trillion per year on average, according to research from Internet Retailer.

“Our online guests are quickly becoming our most valuable guests as well as our most demanding ones,” says Angela Schulz, senior director, Item Center of Excellence at Target. “That’s why we are investing in data quality. We’re transitioning from data as simply foundational to data as a strategic asset that fuels revenue growth.”



Automating Inventory Management

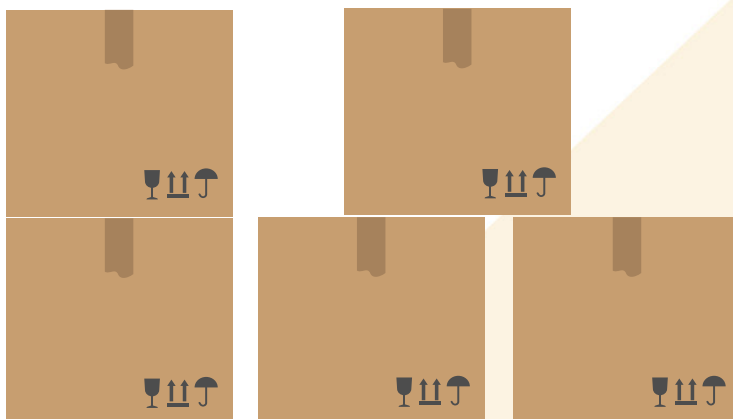
Automated data collection requires a backend system for automatically storing and processing data. This system is the brains of Warehouse Optimization, and it is known as an inventory management system (IMS).

An IMS is a software platform that offers a granular level of inventory control. It enables complete visibility of all inventory as it moves throughout the warehouse. All inventory data is captured and updated in real-time, ensuring greater visibility and accuracy. IMS systems then can automate reporting and take rule-based actions based on the data coming into the system.

Some of the most important functionality of an IMS are asset tracking, monitoring materials usage, alerting managers if stock is running low, product identification and inventory optimization.

IMS systems also typically include additional functionality or can be modified to include specific needs. This could include the ability to capture or track data from supply chain partners, like country of origin (COO) or global trade item numbers (GTIN). An IMS system might also add an advanced shipping notification from a supplier or forwarder, or license plating to enable grouping of inventory for easier management of items as a single unit.

IMS can be integrated with barcode label software for printing new or custom barcodes from mobile devices, too, and field mobility features may be used to extend inventory management to remote warehouses as well as with field service and consignment inventories.





Standalone or Part of an ERP Solution

While standalone IMS solutions exist, most businesses will take advantage of IMS modules built into a more comprehensive enterprise resource planning solution (ERP).

ERP is a centralized, end-to-end business software solution that manages all aspects of an organization, not just inventory control. This typically includes financials, accounting, human resources, sales and other aspects of company operations. All large businesses and many smaller firms use ERP as a centralized nerve center for tighter operational integration, better data sharing, increased visibility, and more complete automation processes across a business.

Because ERP encompasses all aspects of a business and automation is a central feature of the software, many warehouse operations therefore choose an integrated IMS module tied to their ERP system when pursuing Warehouse Optimization.

Whether an ERP module or a standalone IMS is used, businesses should be careful about pairing the IMS with their automated data collection processes to ensure accurate data is moving from the warehouse floor into the system. It is advisable to work with a trusted integration partner when rolling out an IMS as part of the automation process.

Key IMS Features

Typical key features of IMS solutions include the following.

1. Asset tracking

This feature enables a product to be tracked by a bar code, RFID or other means as it moves throughout the warehouse.

2. Reorder point

This alerts managers if inventory is running low and needs to be replenished.

3. Service management.

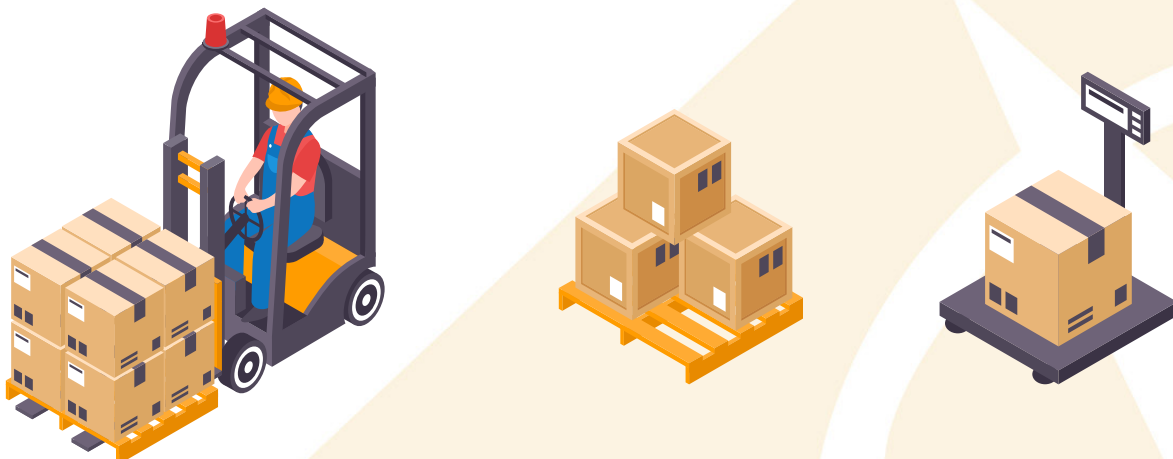
This feature is used to track the cost of materials used to provide services. It helps managers better budget for performing certain services.

4. Product identification.

The use of barcodes, RFID tags and other wireless methods to input products into the IMS. This feature enables warehouses to more accurately identify and track inventory without purchasing expensive standalone scanning solutions.

5. Inventory optimization.

This automates demand forecasting and inventory optimization to ensure key metrics are being met.



Automating Warehouse Management

The third component of warehouse process automation is automating the management of warehouse facilities. This often takes the form on a warehouse management system (WMS).

WMS coordinates with automated data collection and IMS solutions for overall end-to-end automation of the warehouse environment.

Employees in non-automated warehouses spend much of their workday walking around locating items. Time is also wasted moving among different locations for shipping, receiving, restocking and fulfillment.

Another major drain on productivity and worker resources is the time spent on daily maintenance tasks. These can include making space for incoming products, moving stock around and reorganizing and cleaning.

WMS manages these processes by optimizing the steps and paths necessary to achieve certain tasks, handling staffing, and generally tying together all elements of warehouse operations. With a WMS, businesses can automate much of this management and optimize for more efficient warehousing. It handles everything from tracking material movements within the warehouse to providing deep insights about inventory and warehouse operations.

Standalone or Part of an ERP Solution

As with IMS, businesses can use a standalone WMS solution or an add-on that coordinates with a company-wide ERP system. Most businesses choose the latter because it provides deeper overall integration and automation potential over standalone solutions.

While some form of IMS is often included with ERP solutions, WMS is more specialized and therefore usually comes as a separate software solution that integrates tightly with ERP. An example of this is Loxodo, a WMS solution that is separate but deeply integrated with the market-leading ERP solutions for small and medium-sized businesses, SAP Business One and SAP Business ByDesign.

As with IMS software, care should be taken when integrating WMS into a warehouse environment so configuration and linkages work as expected, and all applicable automations are set up properly and validated. Help from a trusted integration partner is a good idea.

Five Ways Warehouse Management Software Helps

1. Improved Supplier and Customer Relationships

A warehouse that tracks and delivers more efficiently will improve customer satisfaction and drive sales. WMS solutions can also strengthen supplier relationships by streamlining the whole inventory and location management process.

2. Reduced OPEX

More efficient use of space, labor and movement of inventory will ultimately reduce operating expenses. A WMS solution can help reduce waste by pinpointing items that are perishable or about to go out of date so they may be sold before they expire.

3. Safety and Security Improvements

Because a WMS can calculate the most efficient movements throughout the warehouse, it reduces the chance of accidents and injury. WMS also offers an audit trail so transactions can be tied to specific workers, reducing the chance of theft and other types of inventory shrinkage.

4. Process Optimization

By optimizing processes throughout the warehouse, companies can pick and automate the types of processes that work best for their specific businesses. That includes picking materials based on algorithms like wave, zone and batch picking. A variety of input methods like smart scales, RFID and bar codes may be used and optimized as well.

5. Improved Inventory Control

By tying to an inventory management solution, a WMS ensures businesses maintain enough stock without running out, but also without overdoing it and needing to store excessive amounts.

Modernizing Warehouse Management

Automation is central for modern, efficient warehouse management at a time when outdated and inefficient warehouse processes are a dangerous competitive disadvantage.

The good news is that the bulk of the modernization effort is process automation, something even smaller warehouses can achieve through affordable software solutions and thoughtful operational integration. While physical automations such as robotics help, there's more to Warehouse Optimization than just expensive new hardware.

Inexpensive bar code scanners mounted to handheld smartphones and RFID technology go a long way toward automating a warehouse, and affordable cloud-based software solutions such as inventory and warehouse management systems provide the backend muscle to truly automate operations. Warehouse Optimization is both necessary and accessible.

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