

## Overview

### Warehouse Management Best Practices

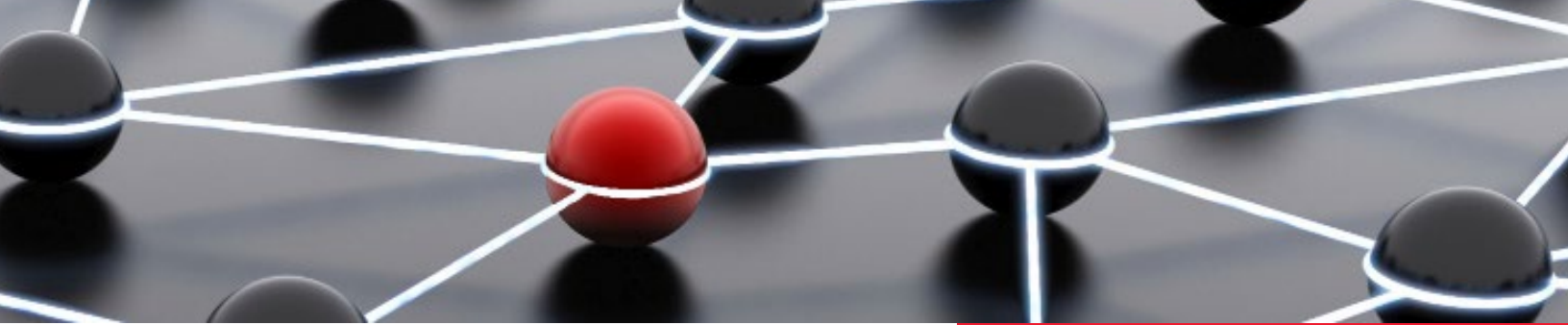
The aftermarket distribution warehouse continues to play a major role within supply chains and will continue to do so for the foreseeable future. While the basic process of warehouse management remains the same, the tasks of managing warehouse operations and the warehouse facility are far from straightforward. With so many factors to consider, it's no surprise there are a multitude of "best practices" and numerous opinions about what truly is considered "best". Deciding what practices to apply to your warehouse can be daunting.



For nearly four decades, AutoPower has worked with distributors to prioritize and institute best practices that are proven ways to increase efficiency, provide great customer service and drive profitability. In the Heavy-Duty industry, we've seen warehouses with just about every type of product you can imagine. Despite the diversity, these distributors share similar warehouse management problems and seek a "Profit by Intention" solution.

This document provides some current concepts, experience, knowledge and warehouse management practices that can be applied by the hands-on aftermarket distributor. We've found that all warehouse operations are not exactly the same, even within the same company. However, the underlying implemented "best practices" tend to relate to three main planning, design and operational areas:

- **Warehouse Space and Activities Optimization**
- **Increased Use of Technology**
- **Effective Management of Resources**



## Automate & Save

### Warehouse Space and Activities Optimization

Basically, this practice is about optimization of the warehouse layout based on activities. The concept is to position activities with a lot of movement between them close to each other.

Whether operating an existing warehouse or preparing for a new distribution center, an efficient layout and workflow plan (developed from an in-depth analysis) is an essential element of an effective distribution center and warehouse operations.

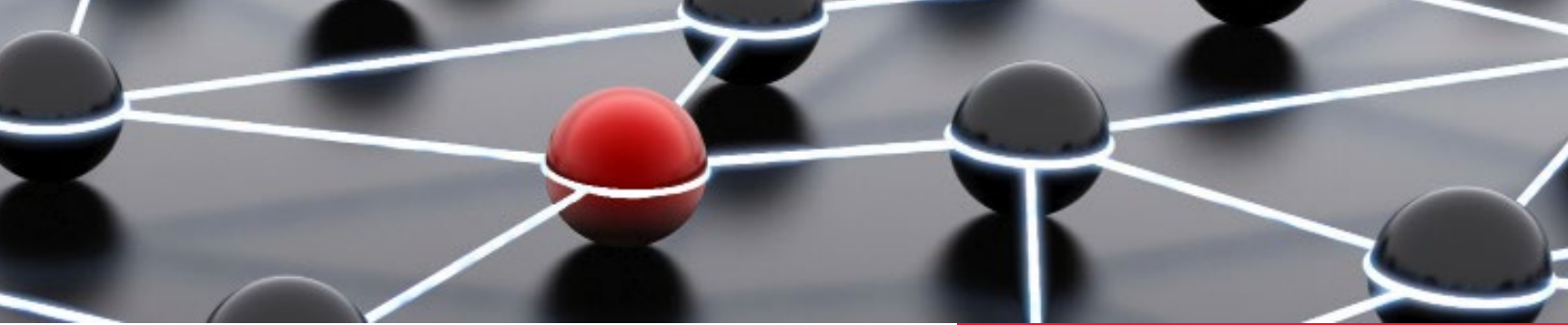
The goal in optimizing warehouse operations is to design work flow paths that minimize total travel distance, mitigate congestion, open sight lines, maximize storage density and conform to physical site restrictions. While that was easy to say, let's focus on areas that will have the greatest impact on your operations. Tangible proven improvements come from focusing on areas of waste and implementing corrective solutions.

#### Problem areas of waste in warehouse operations are:

- **Space** – Usually, the use of warehouse space is less than optimal. Racking systems are not aligned with the expected parts/product flow.
- **Movement** – The unnecessary movement of personnel, walking, reaching, searching due to inefficient layout for put-away and picking processes.
- **Overstocking** – Delivery and storage of parts before they are needed.
- **Waiting** – Personnel delayed at picking lanes, replenishment areas, receiving and shipping areas all slow the fulfillment of orders to customers.
- **Returns** – Activities that cause rework, returns or adjustments caused by discrepancies, damaged, defective, or mislabeled inventory.
- **Poor Storage Logistics** – Internal practices that store fast moving inventory in a less than optimal location that adds labor cost and lowers productivity.

#### Some Best Practices being applied to these problems are:

- Warehouse design outline.
  - Determine high-level space requirements for all warehouse functions like:
    - **Storage** – Pallet Racking, Mezzanine, Vertical Lift Modules etc.
    - **Docks** – Loading docks to load and unload inventoried items
    - **Staging** – Location where inventoried items are staged for processing
    - **Picking** – Warehouse function and zones to collect inventoried items



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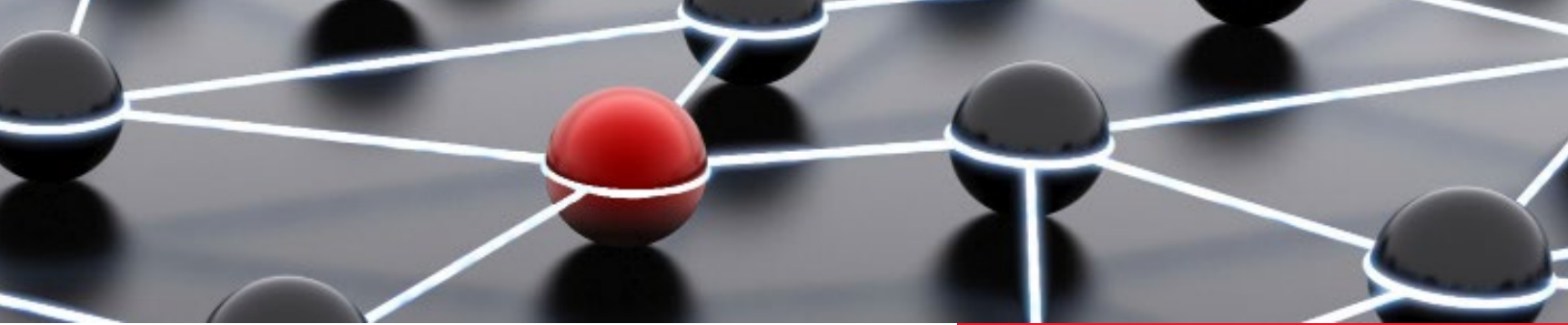
- **Packing** – Warehouse function and area for packing orders to ship
- **Returns** – Area where returned inventory items are staged for processing
- **Aisles** – Areas of passage designed for people and equipment
- **Showroom** – POS and/or pickup “will call” area may support inventory
- **Large assemblies’ storage area** – Large typically heavy item storage
- **Offices** – Office space for staff and warehouse management
- **Restrooms** – Staff and warehouse management bathrooms
- **Support Areas** – Training/Break Rooms, Utility/Equipment Rooms etc.
- Utilize Smart Storage by assigning activities related to parts with longer storage requirements to high-shelf space and high volume parts with labor intensive processes to low-shelf space
- Locate functions near high velocity product (like staging, packing and shipping) close to one another
- Determine a high-level flow design
  - Hot Pick Zones
  - Smart Put-Away, Smart Picking
- Assign optimal parts handling methods to each work flow path
- Document expansion and contraction strategies.

### Best Warehouse Design Targets for Efficiency, Safety and Security

- “U” flow designed warehouse
- Facility twice as wide as deep is a great target
- Use of outer walls for storage of bulk or overstock items
- 80% full occupancy target (Peak Storage needs vs Average Storage Needs). In general, if your total warehouse occupancy rate exceeds 80% then productivity and safety declines dramatically
- Understated projected inventory turn rates vs actual demand can dramatically affect warehouse space requirements. This fact makes accurate and precise projections for turns and sales very important and highlights the importance of warehouse management and inventory management working together

### Benefits of Effective Warehouse Layout and Flow Design

- Reducing travel distance to fast movers
- Balancing the fast movers across aisles/bays to reduce congestion
- Picking very slow movers from reserve storage
- Sizing stocking locations to satisfy required days-on-hand
- Sizing stocking locations to reduce stock-outs
- Maximizing the location cube, resulting in less space required
- Arranging products based on stack-ability on a pallet without damage



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- Developing effective picking zones (category, customer, temperature, etc.)

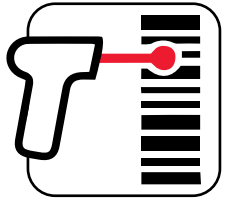
### Increased Use of Technology

The use of technology for the efficient flow of parts in and out of the facility

- Bar Code Systems
- EDI Advanced Shipping Notices
- Mobile Equipment (Labeling, Stock Correction, Stock Relocations, Cycle Counting)
- Automating Picking/Order Fulfillment/Shipping Tasks

### Bar Code Technology

The benefits of automatic data collation via bar code technology and/or radio frequency identification increases productivity, accuracy and lowers labor costs.

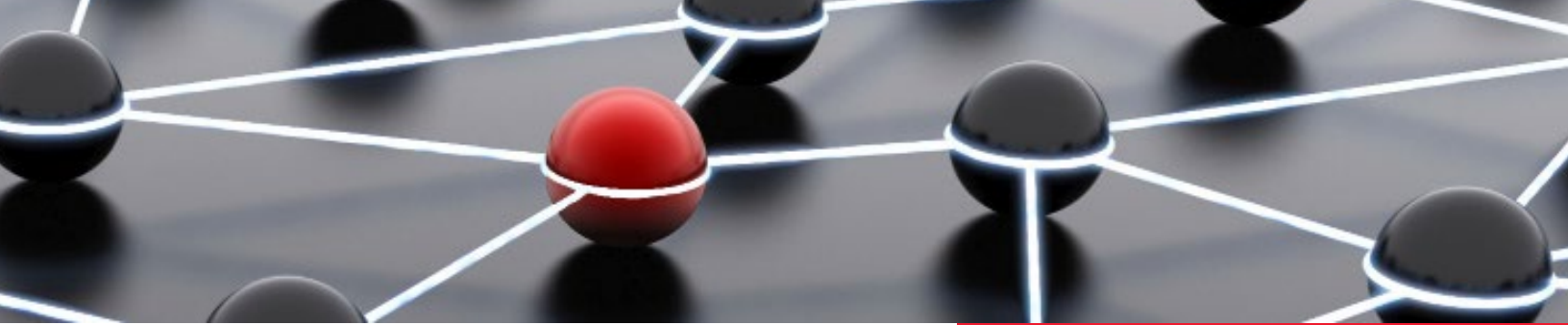


Arming your warehouse staff with mobile equipment like bar code scanners or RFID readers at the receiving dock is essential to immediately identify received parts and eliminates nearly all the errors that are associated with manual receiving processes. Applying this technology enhances inventory accuracy and eliminates errors that eat up a lot of time and resources to correct. Since the information feeds directly into the AutoPower System, the information becomes visible instantly throughout the organization for backorder fulfillment and picking the next sales order.



Another application of barcode technology is work-in-process scanning. This tracks inventory and labor that is committed to a repair or remanufacturer assembly process. By using bar codes to monitor this activity, both productivity and inventory control become visible. It is not unusual for work-in-process inventory to account for up to 30% of the stocked inventory for distributors that also have a service center and/or assembly operations. If work-in-process inventory is not closely tracked, repair delays, production schedule disruptions, obsolete inventory and high inventory are typical. With scanning technology connected to your business system, productivity is increased substantially and work-in-process inventory can often be reduced to just-in-time levels that substantially minimize costs.

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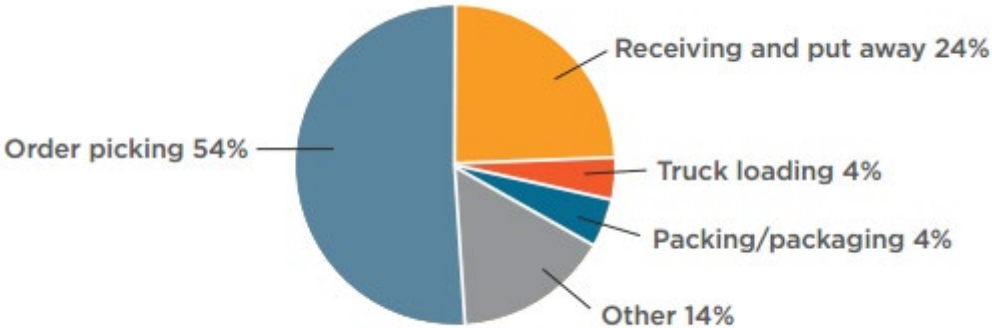
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### Mobile Device Benefits and Application Best Practices

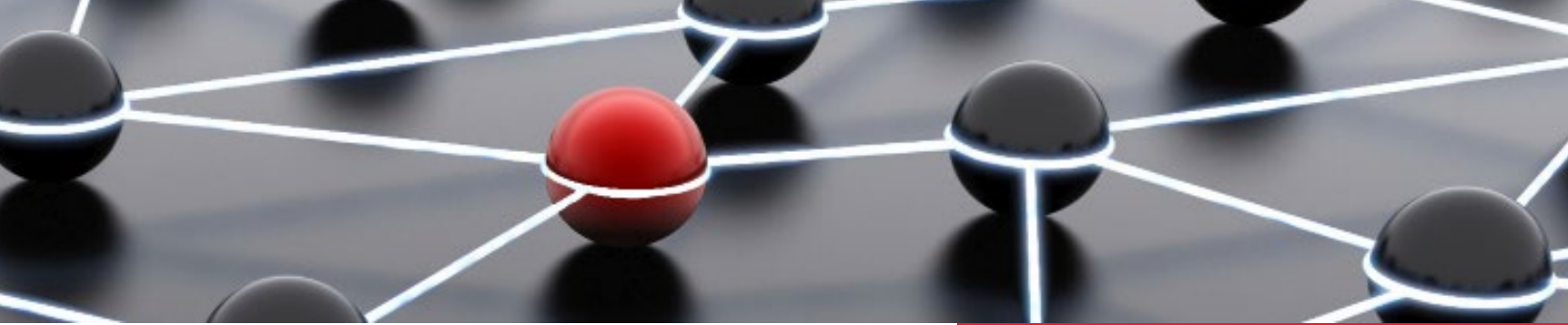
Warehouse operators are using barcode scanners, RFID readers and other types of handheld devices to better streamline the shipping and inventory process. Several warehouse areas where mobility can benefit operations and processes include:

- **Inbound Products Processing:** Mobile devices can provide real-time schedule updates, product shipment scanning and cross-docking solutions
- **Product Inventory Management:** Warehouse operators are recognizing the benefits of mobile devices that can provide accurate inventory management information, inventory cycle counts and material allocation handling
- **Outbound Products Processing:** Mobile devices can be used to view directed pick lists, dispatch plan tasks and shipment tracking data.

**Automating Picking / Order Fulfillment / Shipping Tasks** - Initiatives to implement other automated technology into warehouse processes are being investigated routinely. Aggressive distributors have recognized that that productivity goals can best be met with an efficient process for picking and order fulfillment because, these activities often consume the lion's share of warehouse labor costs. A recent study by the University of Tennessee produced the following average labor cost percentage breakdown across many types of distribution centers.



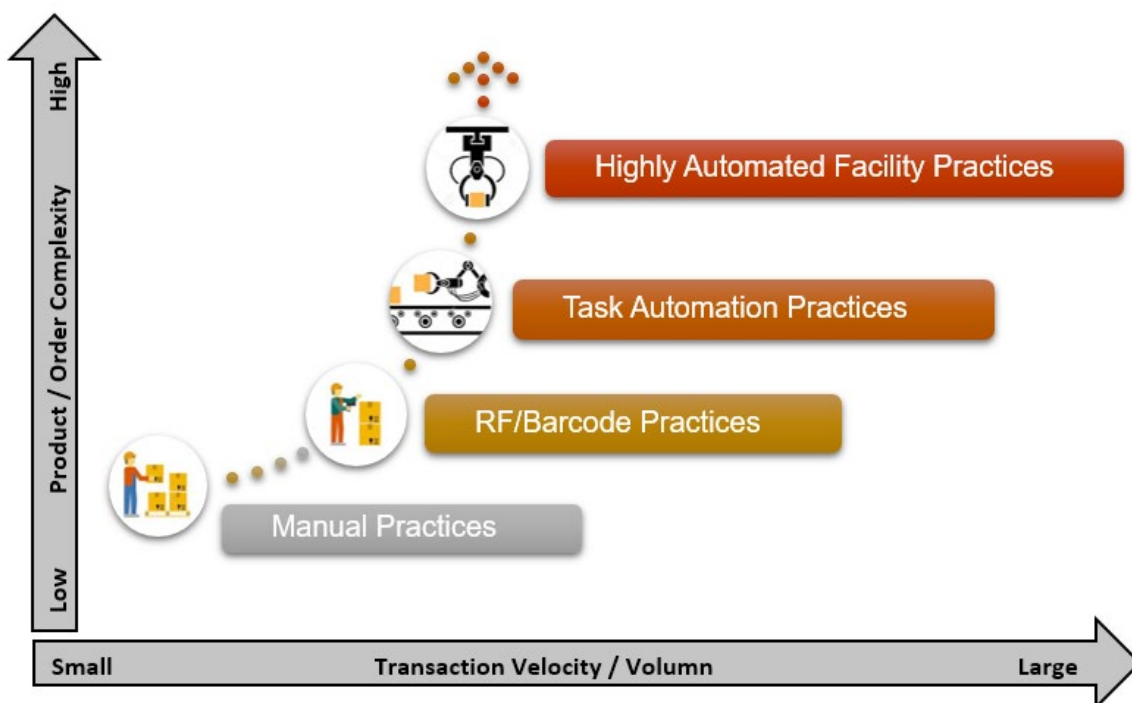
Distributors in our industry can use this type of information to focus on the best areas where labor tasks can and should be automated. The goal is to use warehouse personnel in key areas where their skills and talent can lessen the burden of the fulfillment process. Mobile technologies, data systems, conveyor belts and other automation and technology improvements create efficiency, change lead times and increase delivery satisfaction.

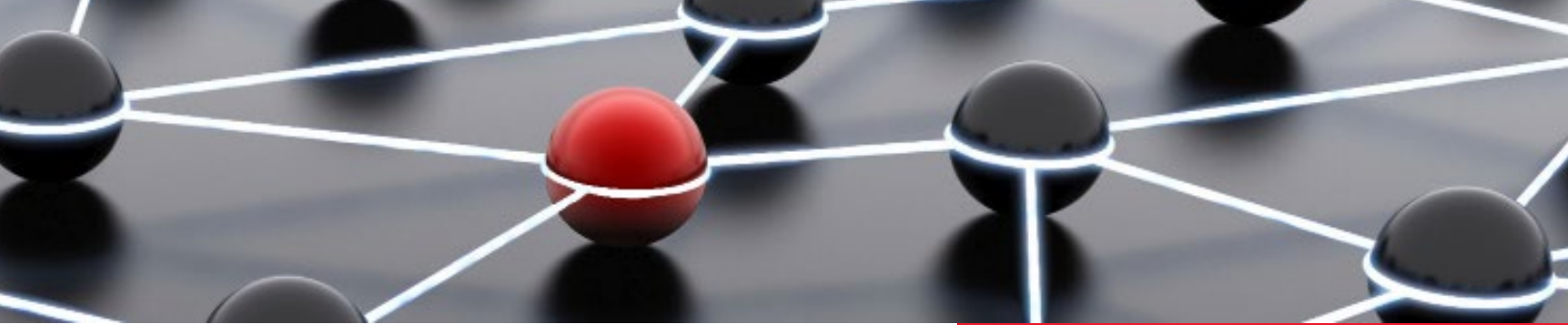


## Automate & Save

The trend toward automation to offset labor cost is driven by increased volume of transactions and by the complexity of the orders being filled; as illustrated in the chart provided below. As customer demand increases and their orders become more complex (variety of product, nature of the product, fulfillment requirements, etc.) your processes need to progress up the following spectrum:

- **Manual Practices** – Labor efforts that have little or no automation involved. These processes are typically the least accurate and least productive.
- **RF/Barcode Practices** – Labor efforts that are supplemented with mobile wireless radio frequency devices and barcode labeled bin location systems. This evolution in warehouse operations is the most critical and immediately impactful efforts a distributor can undertake.
- **Task Automation Practices** – These practices replace labor tasks with automation in key areas within the warehouse operations. Typically, time intensive tasks are the focus and usually the automated tasks are part of the picking processes.
- **Highly Automated Facility Practices** – These large automation efforts replaces labor across a majority of the warehouse operations. These types of business process changes typically automate storage and retrieval systems with carousels/conveyor systems and are in operations at the high end of order volume and complexity spectrum.





## Automate & Save

The trend toward the use of technology is being fostered by increasing demands from customers and the internal pressures to reduce costs while improving efficiency. The introduction of sophisticated automation tools can have a significant positive effect on warehouse operations.

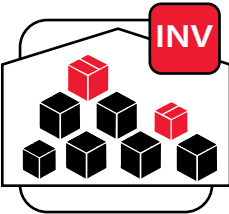
Our experience indicates that aftermarket distributors experience an immediate return on investment when they progress from “Manual Practices” to “RF/Barcode Practices”. We’ve seen some cost justified movement into “Task Automation Practices” usually where the distributor has a continuous high volume of complex orders to a specific customer. However, we’ve not seen any movements to a “Highly Automated” warehouse facility.

For the aftermarket distributor with medium to large transaction volume and a fairly large vendor and product diversity, RF/Barcode and Bin Location practices become critical to speed and accuracy for both the putaway and picking processes. RF/Barcode and Bin Location practices can also significantly reduce warehouse operation costs. Let’s explore how.

### Effective Management of Resources

The most expensive resource in a warehouse is labor. The following are some best practice concepts to help minimizing labor costs in your warehouse operations.

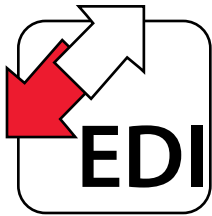
#### Bin Location



The practice of using bin locations for your parts and products allow the put-away processes to immediately identify where parts or products are to be stored. It can also instantly identify needs for the parts on backorders, showroom or specified warehouse zones. Bin locations allow you to locate parts based on backorders and work orders sales velocity rank. Think of bin locations as a map for your staff to follow in the put-way or picking processes. With this map, you can create efficiency that cut labor costs and improves order fulfillment rates.

Another benefit of having discrete bin locations is it helps you identify the “stock” from the slow-moving items by recording the number of times a part or product is picked. The “dogs” in your inventory are taking up valuable space and costing you both capital investment and carrying charges. They are typically picked infrequently or no times a year and should be eliminated from stock and/or drop shipped directly from the vendor when ordered.

### Advanced Shipping Notices



One of the beautiful things about Electronic Data Interchange (EDI) is that you know what's on a shipment and when it will arrive. The electronic documents allow you to schedule staff and make the best use of your receiving dock and put-away processes. By leveraging electronic advanced shipping notifications (ASN) within the purchase order and inventory management functions, labor needs can be planned more effectively. Arriving stock can be organized by putting close-proximity parts together for putaway or moving backordered parts directly to order fulfillment and shipping areas.

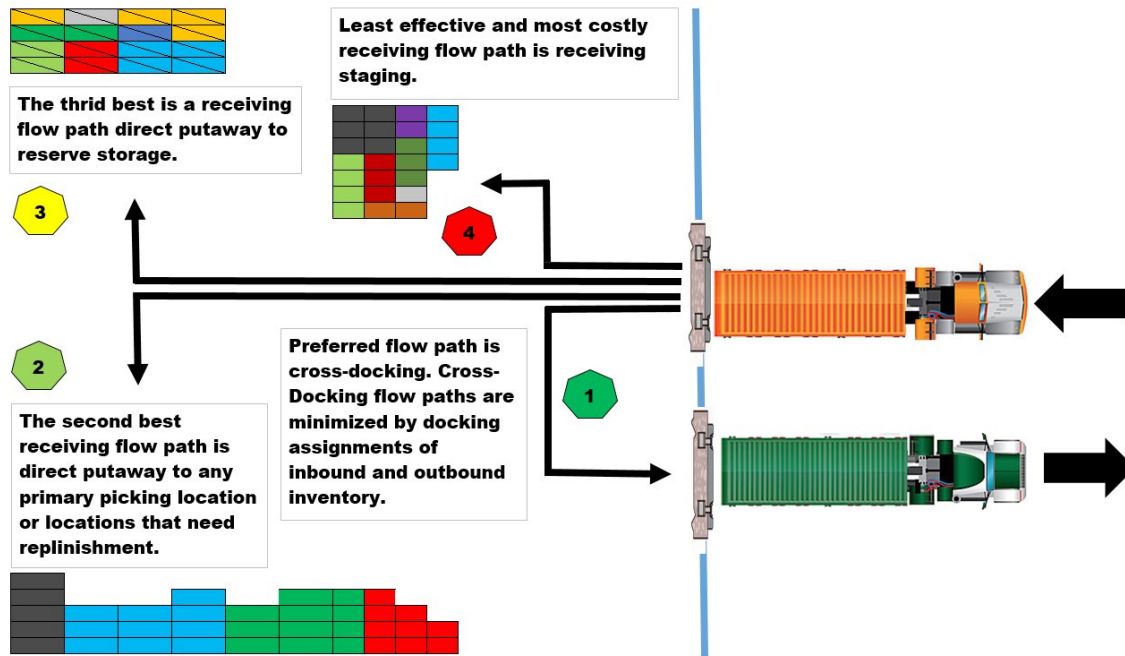
### Proactive Receiving and Putaway

There are a number of “best practices that affect the efficiency and effective utilization of warehouse labor. The following are some concepts that help companies control and minimize these two labor intensive activities.

- Receiving Flow Optimization – The primary goal is to handle product the fewest times possible from the supplier to delivery to your customer:
  - Cross Docking
  - Scheduled Receipts
    - Receiving Crew Scheduling
    - Inbound Dock Assignment
  - Pre-packaging
  - Putaway Prioritization
  - Putaway Location Verification
  - Direct, Directed Putaway
  - Batched, Sequenced Putaway
  - Interleaving Putaway, Picking and Cycle Counting processes

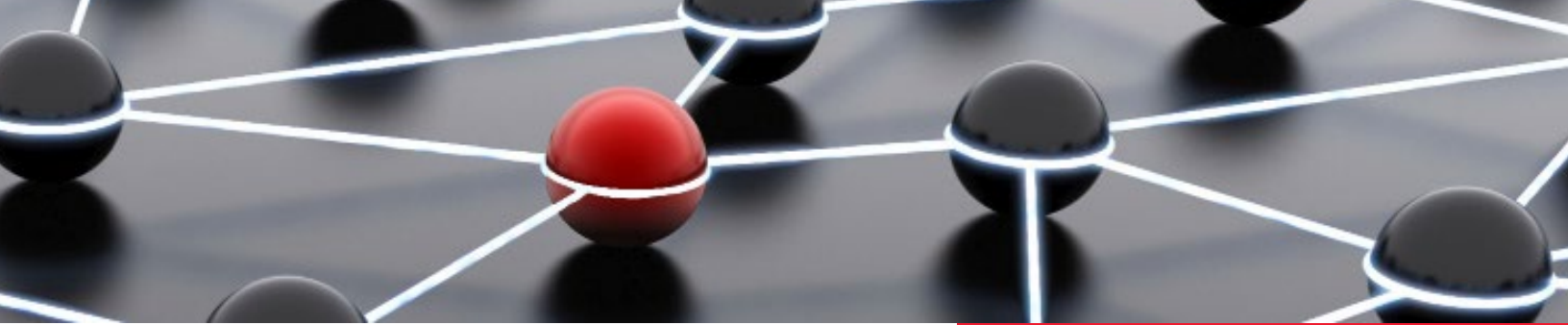


## Receiving and Putaway Conceptual Plan



- Flow Path Optimization** – The goal of flow path optimization is to reduce the number of touches of a product from vendor to your customer. Understanding the touch minimization concept reinforces the benefits of the receiving flow optimization by adding the impact of days in inventory, fill rates, damage control and relative costs. Flow Path Optimization is particularly applicable if you have a number of very large customers. The following provides a conceptual look at the impacts of flow path optimization planning.

Flow Path Optimization	Vendor	Receiving	UnPacking	Putaway	Storage	Counting	Picking	Packing	Weighing	Shipping	Customer	Touches	Inventory Days	Fill Rate %	Damage %	Cost Factor
Direct Shipping	█										█	2	3	99.5	0.5	1.0
Cross-Docking	█	█									█	4	5	99.0	0.9	1.7
Direct Primary Putaway	█	█	█								█	6	6	98.0	1.4	2.1
Direct Secondary Putaway	█	█	█	█							█	8	10	97.0	2.3	3.0
Traditional	█	█	█	█	█	█	█	█	█	█	█	11	30+	96.0	4.5	4.3



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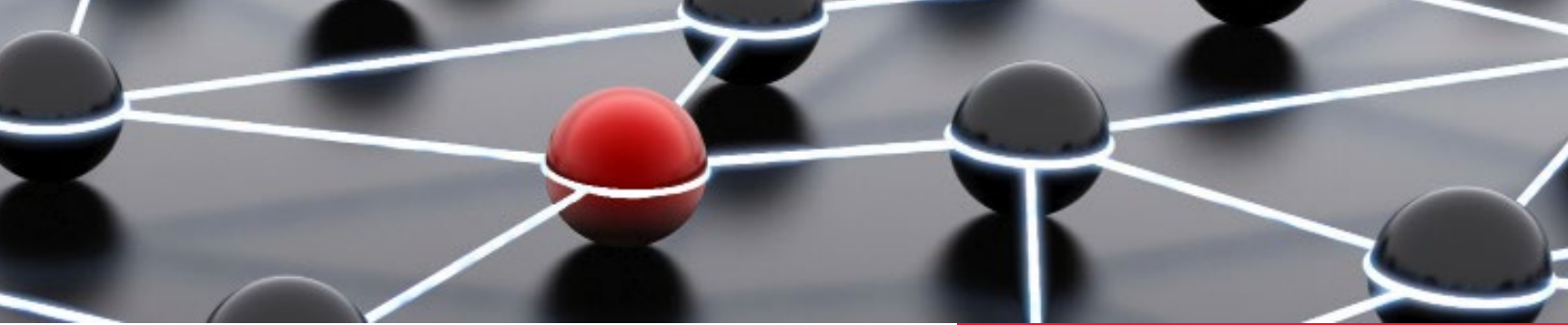
- **Receiving and Putaway Performance Measurements** – We’ve all heard the saying, “What gets measured gets done”. In the case of warehouse labor activities not only does it get done, but with the right measurements it “gets done right”. Here’s a number of best practice measurements to consider:
  - Cost per received load, order, line, pallet, case, piece
  - Cost per putaway line, pallet case, piece
  - Received load, orders, lines, pallets, cases and pieces per man-hour
  - Putaway lines, pallets, cases and pieces per man-hour
  - Dock to Stock Time
  - On-time putaway % (% of putaways within target time)
  - Putaway accuracy (% putaway without discrepancies)
  - Putaway damage rate (% putaways with damage)
  - Putaway safety rate (% putaways without accidents)
  - Perfect Putaway Percentage (% putaways on-time and without discrepancies, damage or accidents)
  - Supplier Compliance Rate (% receipts in compliance with order)

### In Summary

The aftermarket distribution industry faces a growing number of market pressures to optimize their warehouse operations. Pressure for faster order fulfillment, better space utilization, error and damage elimination, and controlling labor costs are just some of the hurdles. The trend to invest in technologies and best practices that increase inventory turns and the efficiency of receiving, stocking, picking and shipping will continue to increase.

Many smart distributors are re-thinking their warehouse operations and re-designing warehouse processes to become more efficient, productive and profitable. The incredible scope of warehouse management clearly requires innovation, technical and human resource skills. Warehouse managers must respond to very tough management goals and customer expectations. To remain competitive and profitable it is important that your warehouse operations be engaged in a journey of continuous improvement.

Do you need help with this incredibly difficult, ever-changing relentless challenge to move to move warehouse operations into the future? AutoPower specializes in the aftermarket distribution industry and is a leading provider of a full range of technology and integrated warehouse management solutions all infused with our “Profit by Intention” technology.



## **Automate & Save**

*This document highlights a number of Warehouse Management Best Practice strategies. We hope you have found the information helpful and useful.*

*Want to learn more?*

**Be In Control – Be More Efficient – Be Profitable By Intention**

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