



Inventory and Warehouse Management Best Practices

1st Edition

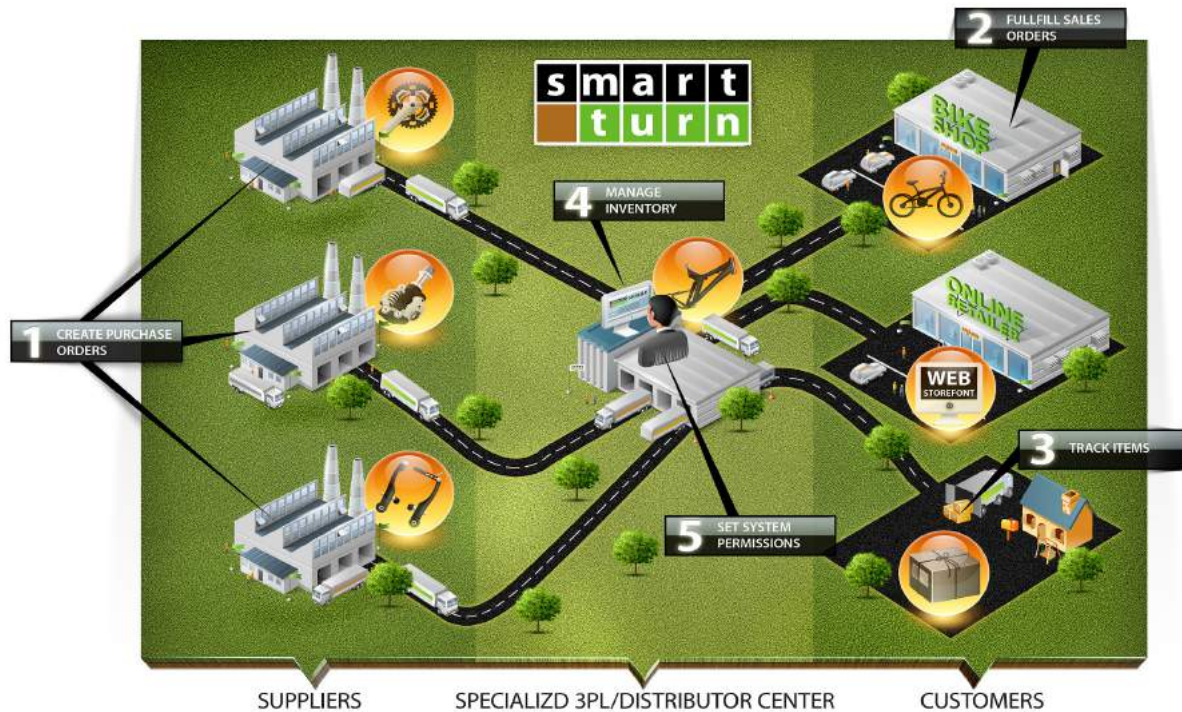
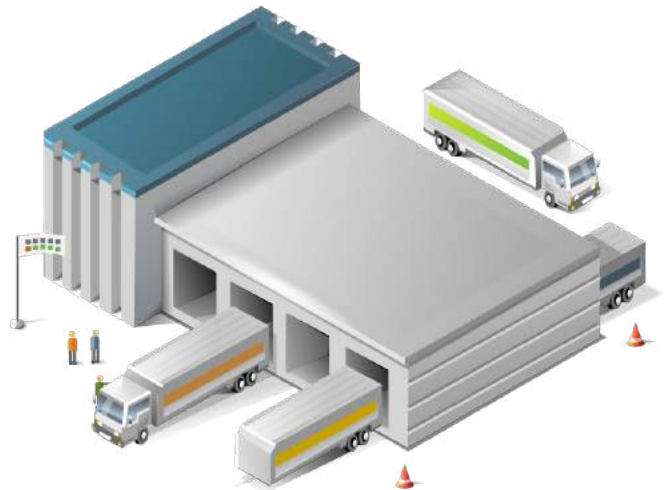


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Preface

GRAPHIC GLOSSARY

Throughout this book, you will regularly see the icons below. They call out specific takeaways for you, the reader.



Tips:

These are specific tasks, ideas, and activities to do or implement.



Notes:

General observations on process improvement.



ROI Opportunity:

These are activities and policies that will specifically make you reap tangible benefits. They are specific steps you can take that promise or can deliver a financial upside through greater efficiencies and savings.

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Introduction

Benjamin Franklin and Albert Einstein are two giants of history who knew a thing about getting things done right. The observation that “insanity is doing the same thing over and over again with the expectation of different results” is generally attributed to both of them.

Does their observation characterize your inventory and warehouse operations?

If your operation is one of the tens of thousands of warehouses in the United States still using paper, Microsoft Excel, or processes first developed in the late 70s/early 80s, we're here to help. To provide you tools, information, guidance, tips, proven methodologies that you can implement throughout your company, we offer you this eBook on “Best Practices for Inventory and Warehouse Management.”

SmartTurn created this eBook for business owners, logistics professionals, accounting staff, and procurement managers responsible for inventory, warehouse and 3PL operations, as well as anyone else who wants to demystify warehouse planning and operations.

The content in these pages will help you make your operation a higher performing machine. Sure, it is a lofty goal but you can do better; you just may not know how. We're here to help you. We won't preach; just teach. If you're the owner or manager, this series is for you. If you're responsible for making your warehousing workplace a more efficient and smoothly functioning profit center, this series is definitely for you. If you aren't motivated by either making or saving money, this eBook isn't for you.

LEARNING FROM SUCCESSFUL OPERATORS

In addition to discussing Best Practices as policy and theory, we're going to discuss how to implement them. In many of the chapters, we'll seamlessly move from the theoretical to the tactical. We'll profile successful small and mid-sized warehousing businesses, showcasing the steps they took when they implemented these Best Practices. You'll learn from companies that can stretch a dollar and make three. We'll look at what works and how well it works. The showcased companies will discuss how IT investments in inventory and warehouse management have improved everything from efficiency and order fulfillment accuracy, to accounts receivable and customer satisfaction. We'll detail how and why their willingness to change and continually improve has paid off.

WHAT ARE BEST PRACTICES?

Best practices are the things that successful companies do very, very well. Few companies know supply chain management better than McDonald's. Research and Development expertise? You'd probably look first to IBM. Branding and marketing expertise? Apple knows a bit about both areas. Coca Cola has always been renowned for its advertising expertise.

Best Practices are the most efficient (takes the least amount of effort) and effective (delivers the best result) way of accomplishing something. They're techniques or methodologies that, through experience and research and quantification, produce better results than whatever was previously done. Better can mean a lot of different things; in general, though, we're talking faster, cheaper and easier.

The Fine Print: Here is the caveat. A commitment to using best practices (in any field) is a commitment to using all the available knowledge and technology to ensure success. We assume that if you're going to spend the time to read most (if not all) of the chapters, you're also going to commit to applying your new expertise and knowledge. We also assume that you are (or at least are interested in) using or learning more about Warehouse Management Software (WMS) technology, the implementation of which makes these best practices far more possible, likely and practical.

According to industry analysts Aberdeen Group, just 47% of companies are currently taking full advantage of the enabling power of WMS applications to reduce labor costs and improve customer service metrics. After you finish our series, you'll really wonder how the remaining 53% justify doing less than they ultimately could (from much less to absolutely nothing at all), given the clear benefits that we're going to detail.

HOW TO USE THIS CONTENT?

Read the chapters. Think about the lessons. Think about how much easier your life would be if you copied what really successful companies were doing. Think about how much more money (sales, revenue, income, etc.) you would have. Then do it.

WHAT THIS EBOOK WILL HELP YOU DO?

Make more money. Pay less overtime. Use fewer resources. Reduce operating costs. Lower headcount. Increase efficiency. Attract, grow, and retain your existing customers. Improve your business processes. Develop insights into your business so you can understand where your roadblocks are.

You'll be able to raise your efficiency in receiving, putaway, picking, shipping and inventory management. You'll be able to increase your on-time, and accurate shipping percentage, and lower overtime costs. You'll garner insight and hopefully some understanding of the problems that are holding you back from making these next steps. What next steps? The next steps you need to increase your efficiency and profitability, etc.

HOW IS THE CONTENT ORGANIZED?

Logically. The chapters assume that you're going (or are likely in the near future) to implement an inventory control and WMS system. We're assuming this much because we want to bring a swift end to your days of exclusively using paper, Microsoft Excel, or an outdated, batch-mode warehousing system. There is a better way to do it. (Some of your competitors already know this, which you may have already suspected).

Here is a preliminary list of initial best practices that we'll discuss:

■ Planning and Setup

We look at the merits of SaaS, off the shelf, and custom WMS systems, as well as the critical topic of warehouse safety.

■ Collaboration

Next, we look at collaboration and its benefits, both inside and outside an organization. How can you create real visibility that you can share with your teams (everyone who needs to collaborate in the order to cash cycle, for example)? We'll discuss the jigsaw pieces that make collaboration possible. We'll also explore Interoperability, wireless connectivity and wireless network planning and setup. We discuss the most important introductory steps to take so you can get started quickly and show immediate impact to your business. We also discuss how to recognize when you're ready for the next step and able to reap the benefits of more advanced technical capabilities.

■ Inbound

With the infrastructure necessary for modern collaboration in place, let's look at how to bring goods into your warehouse facilities. We discuss receiving, slotting and putaway and show you how to improve your inbound efficiencies and accuracy. High performance fulfillment begins with accurate putaway. We show you how to create an inbound system that sets the stage for great outbound results.

■ **Inventory Management and Fulfillment**

Once the inventory is in your warehouse, what are you doing with it? How are you managing it? We look at cycle count policies, cycle counting, replenishment and the annual inventory. When it is time to ship, what do you do? If you're an experienced warehouse practitioner, or a 3PL managing multiple clients or warehouses, you know that more than 50% of operational costs originate with picking. In these chapters, we'll discuss pick policies, technology that supports better picking, kitting and sub-assembly, and picking.

WHAT'S IN IT FOR YOU?

Sure it is a lot of information, but we're giving it to you in carefully measured 200 calorie chunks. You'll have lots of time to digest them. This is important because we'd like you to chew on the following:

According to the American Productivity & Quality Center, the three main barriers to implementing best practices are a lack of knowledge about current best practices, lack of motivation to make the necessary changes to adopt them, and a lack of knowledge and skills required to implement them.

Read every chapter in this eBook and you'll immediately eliminate the first barrier. By the time you've enthusiastically read all the chapters (and perhaps even read them a second time), you'll have a clear idea of what works well, the mistakes you should avoid, and have some idea of how to apply some or all of the lessons in this series to your particular and, dare we say it, unique situation.

We take care of the second barrier by providing you with evidence (both empirical and anecdotal) of the benefits and ROI of implementing these best practices. Because we showcase companies that have successfully implemented change, we eliminate the third barrier. You won't have any more knowledge barriers. Instead, you'll have a glorious opportunity to become a Best Practices-implementing guru at your company. Worst case scenario? You'll be one step ahead because you'll know what you don't know.

Consider the alternative: you can continue what you're currently doing and fall further behind your competition. By doing nothing, you can ensure that one day, you'll be out of business or out of a job. Reading these chapters will help you avoid both fates.

SmartTurn is committed to fostering a self-sustaining community of inventory and warehouse experts through knowledge sharing and learning. Whatever your motivation, we invite you to read this eBook and raise the level of operational excellence in the inventory and warehouse management innovation communities.

Chapter One: Comparing SaaS to On-Premise Warehouse Management System Software

You already knew after reading the introduction that implementing a Warehouse Management System (WMS) was inevitable.

You might have already implemented one. You might even be currently editing a WMS Request for Proposal as a first step. Or, your eyes might be closed shut, hoping that WMS vendors stop calling you, and Modern Materials Handling writers stop writing glowing WMS case studies. Sorry, you can't ignore their ample benefits any longer. You really need a WMS to implement your industry's best practices. But what type?

TO SAAS OR NOT TO SAAS

Let's begin our WMS conversation from the perspective of Software-as-a-Service (SaaS) vs. on-premise software. It is vital to understand their similarities and differences. The applications loaded on your laptop or desktop are examples of on-premise software. A common example is Microsoft Office. QuickBooks hosted on your network server is another. The commonality is that you own (or rather, technically license from the software vendor) the application and host it on-site at your place of work. In fact, if you read the fine-print of your on-premise license agreement, you'll discover that rarely do you actually own the software.

DEFINING SAAS

OK, it is growing in popularity but what exactly is SaaS? Information technology industry analysts Gartner Group define SaaS as "hosted software based on a single set of common code and data definitions that are consumed in a one-to-many model by all contracted customers, at any time, on a pay-for-use basis, or as a subscription based on usage metrics." In the SaaS delivery model, software vendors host applications over the Internet and deliver them to customers for a recurring license fee. Instead of launching applications from your hard drive, you access them via web browsers such as Internet Explorer, Firefox, Safari and Opera. One of the most common SaaS delivery models is the single instance, multi-tenant arrangement in which a common version of the software is hosted at a central location and used by many different companies. Any employee with access via subscription (usually restricted through unique user names and passwords) can log in and begin working.

WINDS OF CHANGE

While on-premise has been the application delivery standard for decades, the SaaS delivery model in which you access applications through a Web browser is a more recent (and increasingly popular) application delivery option. SaaS enables software companies to build powerful, highly secure, and flexible applications and then deliver them to a broad customer base.

SAAS BENEFITS

There is much to love about SaaS. It is not for everyone to be sure. But it certainly delivers technical, operational and financial flexibility that the smaller warehouse or 3PL operation needs to service existing accounts and develop new revenue opportunities. Here are some of the key benefits that many SaaS users have experienced:

Reduced initial costs compared to on-premise applications

SaaS is almost always much cheaper software to both evaluate and deploy. Customers who would have previously evaluated software in-house prior to purchase can now simply visit a SaaS vendor's website and try the software before buying.

More predictable, usage-based recurring costs

SaaS users will experience a sharp reduction in their software management costs. That's a very good thing. Configuration, maintenance, and updates/upgrades tasks disappear. You simply eliminate the need to maintain some of your infrastructure. To see what the savings might look like, do a quick "scratch-paper" cost calculation on how much you are paying to back up your current data. (You are backing up, aren't you?)



ROI Opportunity: SaaS users can redirect their scarce IT resources to strategic initiatives, such as business process improvement. Studies have shown that most IT managers spend over 85% of their time on maintenance instead of innovation.

Fast application deployment, often shortly after signing-up

Few companies use exactly the same processes. The majority of software users require changes to optimize software functionality for their own situations. On-premise vendors typically meet this optimization need by customizing their products. To do this, they write new code. Historically (in the pre-SaaS world), if you wanted a system with custom fields, custom user profiles or data access, you needed a customized system that required either extra payments to the software vendor or payments to a consultant. In contrast, customization with SaaS usually means spending time appropriately configuring the system before using it. As you can imagine, configuration is much faster and cheaper than customizing software code.

Reduced complexity

With SaaS, you don't have to buy or install additional software or hardware. You don't need to tap IT resources to deploy your new WMS. You'll avoid resource allocation issues. Reduced complexity with SaaS delivers important financial benefits in the short-term (through avoiding capital investments), as well as in the long-term (cheaper operating costs). Consider that the average on-premise deployment for a mid-sized company can take up to 12 months. An entire "plan-configure-run" cycle for a WMS SaaS system can take less than a month. Much of this faster time-to-deployment is due to eliminating complex on-premise setup planning. SaaS systems also offer the option of dynamic modification, which is especially helpful if you haven't mapped out your business processes as well as possible. Non-IT users can even make business process changes. What if one of your customers needs to have a "first expired, first-out" picking policy, or you decide to switch from LIFO to FIFO for some of your items? With SaaS, a configuration change is all it takes. To handle these types of evolving business processes, or if you have an organizational habit of making it up as you go along, SaaS is definitely the way to go.

Better support

SaaS vendors add new features and updates incrementally, delivering them to all customers at once and keeping the user interface as consistent as possible. This "common-delivery-to-all" approach eliminates the burden on each customer to test and implement software updates and changes. It's also much easier to customize the software for the customers because of the shorter development cycle. Support becomes ubiquitous because all SaaS vendors need to constantly deliver on the promise, otherwise customers can easily depart.



Note: Due to the homogenous nature of SaaS software and the SaaS vendor's absolute imperative that it function as promised, the SaaS model generally provides a better user experience.

Ongoing free upgrades

SaaS vendors handle software updates, upgrades and patch management issues. You'll have the freedom to focus on your core business. Most feature improvements happen transparently. New feature updates occur in waves of functionality, remaining hidden till you want to turn them on.

Access and scalability

SaaS offers global accessibility. Scalability is not a concern. As long as there is Internet access and a browser handy, you, your employees, your business partners and your customers can access your WMS data. A SaaS model can instantly connect multiple warehouses. All your trading partners and customers can access and manage inventory across the supply chain in real-time, modifying orders, demand-planning, ATP, CTP, safety-stock and reorder points.

In reality, though, most SaaS WMS customers first want to realize small improvements within their own warehouse. Simply migrating from a spread-sheet or legacy based system alone is a huge improvement. Extending a WMS upstream to suppliers or retail partners can follow later. These small improvements eventually aggregate into great improvements on the bottom line. If you are a 3PL or Logistics Service Provider, these issues multiply across your entire customer base. Customers want to reduce logistics costs, but they also want to maintain control of their supply chains. As a 3PL, the SaaS model delivers an infinitely better model if you have to change profiles, access, configuration, and items.



Note: The ability to connect with a pre-existing community of partners and provide them with inventory visibility and transparency is unique to SaaS.

Total Cost of Ownership

This is in many ways the biggest benefit. It is almost the “super benefit” in that all of the benefits cited above aggregate into a lower total cost of ownership over the lifetime of your use of a SaaS system. The lower long-term cost of ownership is not solely due to the considerably reduced up-front costs. Eliminating maintenance and upgrade costs also eliminates disruptions and downtime in operations. Upgrading to an on-premise software package can exhaust resources, a penalty that only expands in proportion to the level of required customization. With the SaaS model, users remain current with the latest version of the software.

CONCERNS ABOUT SAAS

As a delivery model, SaaS has been around for less than a decade. Non-users will justifiably have some concerns.

Data Control

Previously, companies exercised complete control over their data by storing it on-site. Lack of control of organizational data is perceived as the biggest downside to the SaaS model. Some SaaS proponents think this concern is actually counterintuitive, arguing that a move to a SaaS environment actually delivers more control and more value because the data remains in a high-value and highly available environment. If you've ever been at the mercy of an internal IT department that doesn't share your priorities, you probably wish you had more autonomous data access, which is what SaaS delivers.

Data Backup

With SaaS, data backup is offloaded to the SaaS provider. This might sound scary but consider that the backup and data recovery strategies for most SaaS vendors are superior to many internal IT departments. Take the time to find

out what they are. SaaS can deliver more than acceptable levels of availability, scalability and reliability a fraction of the cost of on-premise options.



Tip: Make sure you research backup policies for any SaaS vendor you are considering using. Find out how they protect sensitive customer, sales and other data.

Application Failure

What happens if the application goes down? Can the SaaS vendor reboot the system faster than your own internal IT department or IT service partner? Again, ask about uptime performance and ask for customer references before you commit to one SaaS vendor over another. Contact existing customers to learn about historical performance. Ask to see their performance charts.

Network Access

If your Internet access goes down, so does your access to your data. This could be as much an issue of the reliability of your network provider and your contingency plans. Realistically, if your Internet access goes down, however, you'll likely have much bigger concerns about how this connectivity issue is suddenly affecting your order management, email, accounting, and freight management systems.



Tip: Internet access provides much more than access to SaaS data. Take the time to revisit your network provider's historical uptime performance. Perhaps it is time for a change or a Plan B such as a DSL modem on standby.

Integration and security

Software-as-a-Service also conjures up security and IT management issues. As these applications are delivered by third parties, and are often championed by non-IT staff, the IT department can be worried about the extra work they perceive they may have to undertake.



Note: Just because an application is web-based, it doesn't mean it doesn't have to adhere to a company's security, privacy, and Internet use policy requirements. If you are considering SaaS, make sure you research the vendor's security policies and practices.

As IT department become more familiar with the SaaS delivery model and SaaS vendors, IT departments will become more comfortable with integration and security issues when the data resides off-site.

COST ISSUES OF SAAS OPTIONS

Total cost of ownership is an issue regardless of what type of software you use. Companies pay for applications in one way or another. You either pay through purchasing and licensing, as is the case with on-premise, or you pay some manner of subscription or usage fee, which is the SaaS model. Most often, those companies are paying a monthly subscription fee; that may be a flat fee, or it may be based on the number of system users on the system or some transaction or volume estimate.

You're already paying for desktops, notebooks, and Internet access anyway. Internet access bandwidth for in-house and remote users usually carries a fairly fixed cost structure, especially due to the commodity and competitive nature of the industry.

COST ISSUES OF ON-PREMISE SOFTWARE

On-premise software carries a variety of additional startup costs during the first year. You'll have to budget for initial testing and evaluation of both the software and the necessary hardware to run it. You'll have to buy the appropriate number of licenses for your site(s) and budget for user training, and tech support. In year two and beyond, you'll have to pay either annual maintenance fees (usually 18-24% of the initial per-seat license fee), or just wait for the big software upgrade, which you can expect to face in year three.



RO Opportunity: Maintenance and upgrade fees don't exist in the SaaS world.

PONDERING THE FUTURE

You haven't reached decision day yet but we're getting you there, aren't we? When comparing the SaaS model against the on-premise option, the big question to ask is what does the application need to do? Your decision should not just focus on the money. Certainly look at what each delivery model will cost, but also consider other factors such as is what each software option will allow your company to do now and become later. Consider the amount of evaluation, installation and implementation time you will need. Factor in cost estimates of lost time (and possibly revenue, too) from integration and, in the case of on-premise, of future upgrades. What will a couple of hours (or more) of downtime cost in the future?



Note: On-demand WMS is not for everyone. While they are best suited to simple to moderately complex operations, they are not designed for complex processes, highly customized needs, or highspeed automation environments where any latency can cause problems.

MOVING FORWARD

Gartner Group researchers predict that 25 percent of all new business software will be delivered as SaaS by 2011. That is only three years away and the WMS industry is certainly contributing to this growth rate. It is hardly surprising that SaaS has become such a disruptive force in the application delivery industry as it is particularly well suited to the needs of smaller inventory and warehouse operations. In the Gartner research, many below average performers see SaaS as a way to quickly catch up to their competitors. For WMS operations that need to improve their game (or those already operating strongly), take a serious look at the SaaS model and you'll quickly see how it will help you deliver a lot more value to your business partners and customers.

Chapter Two: Warehouse Safety

INTRODUCTION

There is more to warehouse safety than compliance with fire codes and OSHA regulations. Unfortunately, too many warehouse and 3PLs look at safety as meeting the minimum mandated by law or their conscience. Often, neither goes far enough. In this chapter, we're going to look at Best Practices for Warehouse Safety, discussing the benefits and risks to employees, managers and employers of both creating a culture of safety in the warehouse, and failing to do so.

For those companies that fail to promote safety, it is often due to insufficient time, inadequate resources, or the opportunity to save money through corner cutting. In the long run, however, a safe warehouse environment delivers important cost savings through: higher employee satisfaction and increased productivity, fewer workplace disruptions and reduced absenteeism and equipment downtime. You can extend the life of your warehouse infrastructure such as storage and material handling equipment, as well as reduce damage to inventory. Most importantly, don't assume that a safe workplace carries a jaw-dropping price tag.



ROI: By creating a safer workplace, you will also reduce damage to and loss of warehouse equipment and fixtures along with stored inventory.

While you will have to bear the cost (likely smaller than you think) of creating a culture of security in your operation, the responsibility buck also stops with you. Don't expect employees to drive it; establishing a safety culture, including the requisite operational changes and training and education programs, starts with you. It starts with rules and guidelines that your Mother probably told you decades ago. If you didn't start doing them when you were 10, it is about time.



Note: Determining hazard classifications and code requirements calls for an expert to help you understand the details.

GENERAL HOUSEKEEPING

While a warehouse is a controlled environment (albeit an often hectic and even frenetic one), employees spend their workdays and nights subject to a wide variety of potentially injury-causing hazards. Potential problems can instantly materialize depending on what they are doing, the equipment in use and materials handled.

Prevention of incidents and accidents (mortal or otherwise) begins with good housekeeping, which is essential to a safe warehouse. This means heeding common sense; keep docks and floors free of boxes, garbage, boxes, baling materials, debris, dirt, and oil. Piles of trash and debris are a potential fire hazard and hinder evacuation. Make sure that garbage and debris bins are available throughout the warehouse.



Tip: Garbage bins are cheap. Buy enough to ensure that employees don't have to walk far to dump garbage. If they do, debris will accumulate. Make sure someone is in charge (usually the person responsible for building maintenance) of emptying them.

Some other essential, yet too often, overlooked housekeeping basics include:

- **Make sure that flooring surfaces are non-slippery and free of pits and dents**
- **Report loose or damaged flooring or other tripping hazards that need repair**
- **Don't leave box cutters or other sharp tools lying around**
- **Keep cords and wires off the floor**
- **Clean all spills immediately**
- **Don't leave items in aisles, on the floor, or stacked insecurely on flat surfaces**
- **Don't block extinguishers, sprinklers, or fire exits**
- **Create designated areas to store empty pallets and limit the stack height to six feet**



Tip: Battery charging areas require their own care. Common safety codes usually demand specific safety measures, including ventilation, eye wash first-aid stations, acid neutralization, and spill control systems.

FALLS AND OTHER PREVENTABLE MISHAPS

Warehouse safety is designed to prevent death as well as far more common accidents and non-lethal injuries. Workers can slip, trip, stumble, fall, or be struck by falling objects, breaking hands, feet, toes and other body parts. Many of these accidents could have been prevented had warehouse owners and management followed some or all of the following recommendations:

- **Heed the good housekeeping recommendation above to maintain a clutter-free floor absent of hazards such as electrical cords**
- **Block access to exposed or open loading dock doors**
- **Permit access to above-floor racks and shelves only if portable ladders or appropriate lifting devices are available.**
- **Use personnel safety cages when lifting employees with forklifts**
- **Enforce speed limits for forklifts and lift trucks**

MATERIAL HANDLING SAFETY: THE HUMAN BODY, FORKLIFTS AND EQUIPMENT

While President Calvin Coolidge famously opined in the 1920s that “the business of America is business,” the business of warehouses is to move product and materials. And moving material products and materials, whether manually or with powered equipment, can be dangerous. Sources of danger and origins of hospital visits range from box cutters, splinters on wooden pallets, and back injuries, to forklifts and heavily laden pallet jacks.



Tip: Teach employees that items can often be moved with equipment such as a dolly, a handtruck, or a forklift. Use mechanical help wherever possible.

Although the effects of slips, tumbles, forklift accidents, fires, and chemical spills are usually apparent immediately or soon after the incident, most warehouse workers ultimately suffer from the very common problem of back pain. The aggregate toll of regular heavy lifting, stacking, bending, and twisting is painful; according to the National Institute of Occupational Safety and Health (NIOSH), warehouse workers are at least eight times more likely to suffer back problems than other workers,

Let's look now at some best practices that will reduce back problems, ensuring fewer man days lost due to repetitive lifting.

MANUAL LIFTING

Despite technology improvements, it is hard to envisage a warehouse any time in the future where manual lifting will be completely absent. Some materials simply must be moved by hand. If this is done improperly, the not surprising result is injury. Not all of these injuries result from sudden trauma, however. Many arise through accumulation of abuse. A minor injury can occur and progressively worsen over time. For many workers, the result is a lifetime of discomfort and chronic pain.

While proper lifting technique is critical to back health and safety, planning is also important. Before moving a box or anything else, employees should ask themselves a few quick questions: How heavy is it? Where does it need to go? Does it have to be moved manually? If the answer to the latter is yes, then employees should heed the following "rules" for material handling:

- **Know what you are handling**
- **Test the load before lifting it. If it is too heavy or bulky, get help**
- **Keep your back straight; don't bend over**
- **Use your legs—not your back—to lift**
- **Lift cartons by holding opposite top and bottom corners**
- **After lifting, be sure you can see over the load**
- **Don't twist your back while carrying a load. If you need to turn, take small steps in the direction you want to go.**
- **Use equipment (like drum trucks) to move barrels and drums**

While back pain is certainly one of most noteworthy health challenges, warehouse employees also suffer other shoulder, elbow, knee and feet ailments such as pulled and strained muscles, pinched nerves, and sprains. Depending on the repetitive task, employees can also suffer from carpal tunnel syndrome, a painful condition shared with many who spend their workdays typing.

FORKLIFTS AND MATERIAL HANDLING EQUIPMENT

Although forklifts and material handling equipment like pallet jacks and drum trucks make moving heavy items much easier, they can become very dangerous when used improperly. The first requirement is to provide training on all automated or mechanical lift equipment. Employees who will be using forklifts should be both trained and licensed by the appropriate authority. In addition to these commonsense guidelines, here are some other suggestions to help employees avoid damaging people or property when using forklifts and material handling equipment:

- **Encourage employees to immediately report (anonymously if needed) unsafe conditions or behavior**

- **Use striping to delineate aisles and passageways, including doorway and loading dock areas**
- **Keep aisles and passageways clear at all times**
- **Don't assume that the equipment operator can see you or react in time to stop. Assume that you are in his blind spot at all times.**
- **Look both ways and move slowly when emerging from aisles, doorways, or offices**
- **Prohibit walking on pallets and using forklifts and pallet jacks for rides**
- **Be careful around conveyors, making sure not to get body parts or clothing caught in the machinery's moving parts.**
- **Teach employees to push manual material handling equipment whenever possible, rather than pull loads**



Tip: Make sure employees know where the on/off and emergency stop buttons are on equipment they work on or around.

FIRE SAFETY

Fire safety is a challenging balance. You have to weigh safety with the operational needs of your facility and business. If you significantly reduce storage space due to a very cautious safety plan, (such as installing in-rack sprinklers) you'll reduce potential throughput volume and increase maintenance expenses. True, you're probably reducing your hazard exposure, but how much protection do you really need? How can you best determine whether your warehouse's fire safety design and practices are sufficient? Hire an outside consultant.

The difference between a small fire and a catastrophic fire can often be attributed to how much safety expertise was invested in the warehouse design and later in its daily operation. The consultant will help you evaluate both of these areas. An important supplemental benefit is that you'll be ready for a visit from the local fire department.



Tip: Make sure that employee training includes locations of fire extinguishers and how to use them.

Fire Codes and Inspections

The aim of fire codes is achievement of a minimum level of acceptable safety. It shouldn't be surprising then that they can't cover every possible event such as the unexpected hazard of a stricken airplane plunging into a building (see the July 2000 Concorde disaster in which an Air France Concorde slammed into a hotel and restaurant outside Paris shortly after takeoff).

While codes can't prevent these one-in-a-million occurrences, they are used to determine building access, aisle widths, fire walls, smoke and heat removal systems, flue space requirements and sprinkler density (including in-rack sprinklers). In addition to confirming that the building meets code, fire inspections also confirm the absence of hazards such as the presence of flammable debris, blocked exits and aisles, missing fire extinguishers and exit lights, as well as damaged sprinkler systems.



Tip: If you don't already do it, or your state still allows smoking on-site, do your employees' health a favor and outlaw smoking. Prohibit smoking in your warehouse and post no smoking signs.

INVITING YOUR LOCAL FIRE DEPARTMENT FOR COFFEE AND AN INSPECTION

It is important to maintain a dialogue with your local fire department that extends beyond the annual inspection. If you have added hazardous materials among your inventory, you need to have this information available to the fire fighters in the event of a blaze so they know what they are dealing with.



Tip: Pay attention to changes in packaging material as they can have a substantial impact on the flammability of materials in your warehouse.

CHEMICAL SAFETY

Chemicals in the warehouse, whether as part of operations or inventory, can also create important safety risks. Using or storing them contrary to the manufacturer's recommendations and fire codes can lead to serious personal injury or fire risk. Make sure you have material safety data sheets available for all chemicals used and stored on site. Knowledge of the chemicals should include their usage, appropriate storage requirements, and first aid procedures. Aerosols, for example, can become flaming rockets in the event of a fire, necessitating specific storage regulations that vary depending on chemical content.



Note: Hazardous materials include a range of industrially-produced materials such as solids, gases, flammable liquids, explosives and oxidizers. Not surprisingly, they have their own codes.

TRAINING AND EDUCATION

Employees and management training are critical and should be mandatory. Training should also be more than just one or two days when employees are trainees; continue it throughout employment. Everyone with cause to work in the warehouse (from drivers and pickers to managers and accounting clerks) should be trained. Don't let employees avoid training by accepting their claims that they're experienced. They might need to have their bad habits exorcised and you can do it with hands-on, experiential safety education that mixes lecture with small group sessions.



Tip: Give pre- and post-training tests to confirm that employees have retained the information.

Integrate safety training into regular operational procedures to ensure that battery charging, propane cylinder handling and evacuation plans are part of the employee's regular training program.



Tip: Educate senior management about occupational safety and health so they will understand how it helps achieve business objectives.

Ye Olde School Fire Drill

Sure, they were fun in school. Later in life, adults, too, need to learn what to do in the event of a fire or the sounding of the an alarm. Warehouse employees should be advised during training to leave the building using the nearest exit immediately upon hearing a fire alarm. Take into account that some employees may have to complete certain tasks such as turning off equipment before fleeing the building.



Note: As part of training, ensure that employees responsible for shutting down certain equipment understand the conditions when they should perform the task or immediately leave.

Ensure that all employees are aware of:

- **Procedures for reporting incidents to management (and other appropriate emergency resources such as 911), including after-hours telephone numbers and what types of incidents to report**
- **Location and use of fire extinguishers and other emergency equipment**
- **Emergency exit locations and evacuation procedures and collection points outside the building for all employees**
- **Procedures to account for all employees and visitors**

CRIME AND PUNISHMENT

Education and safety are only effective if employees follow the teaching, guidelines and rules. Safety is for the benefit of all employees, from the trainee to the CEO. Compliance should be a condition of employment. It is vital that everyone do their part—from properly unplugging electrical cords, to driving forklifts at proper speeds. One way to ensure compliance is to implement a progressive disciplinary program that, while punitive, is not overbearing.



Tip: Make safety part of employment reviews. In addition to penalizing employees for not following safety rules, reward them for making your operation a safer place to work.

SAFETY IN YOUR OWN HOME: MAKING YOUR WORKPLACE AS SAFE AS POSSIBLE

Now that we've discussed the importance of making your warehouse operation a safe one, how can you start? Step one is to conduct a safety audit. Invite an outsider to visit your facility. That fresh pair of eyes may see existing or potential problems that haven't caught the attention of those who see them daily.

Some Order Through Striping

Make sure to designate floor storage and staging areas with striping. You can't do too much floor striping. Use tape and/or paint to designate floor areas approved for storage or material staging. It will bring order because everyone will know exactly where to perform certain activities.

Encourage Employees to Report Unsafe Conditions

Encourage employees to report working conditions that they deem to be unsafe. Empower your employees to err on the side of caution by creating an anonymous reporting system

Pay Attention to Almost Accidents

Near misses help you identify trends and damage that portend worse things in the future if the status quo continues. Lost days to injury do not tell a complete story and the pain, suffering and time off work cost workers and employers money.

Bad Things Will Happen to Good People

In spite of your best efforts and planning and training, accidents will happen. When they do, don't concentrate com-

pletely on attributing fault and blame. Investigate the causes, too. Look beyond the incident for causes that may exist unnoticed in other past of your operation.

Do More Than the Minimum

Codes and compliance are only intended to provide a certain minimum level of safety. The final recommendation when planning or incorporating safety into your operation is to look to the future. Consider a design that is flexible and capable of handling a higher hazard classification. If your business changes and the products you are taking into inventory become more dangerous, or flammable, etc, it can be very expensive to upgrade to accommodate the higher hazard classification.

A LAST WORD ON SAFETY

According to research, working in a warehouse is one of the 100 deadliest jobs in the United States. Falling boxes and containers, forklift and other vehicle accidents account for the majority of deaths. Focus on creating and maintaining a warehouse environment where worker safety is paramount. Make safety part of the the daily job and you will lose fewer workers to death, dismemberment and days off. Remember that warehouse deaths are almost always preventable.

Whether yours is an industrial, commercial or retail facility, your workers should follow clear and known safety guidelines for material storage and handling (conveyor systems, forklifts and pallet jacks, operation) as well as the general housekeeping recommendations we began the chapter with.



Note: Don't let anyone claim they don't have time for safety. Make sure that management is aware of the importance of safety and incentivized to reduce and eliminate hazards.

RESOURCES

National Institute for Occupational Safety and Health (NIOSH)

A federal agency that helps prevent work-related injuries and illnesses. NIOSH publishes a number of publications on workplace safety, including a guide to safe lifting practices.

800/232-4636

<http://www.cdc.gov/niosh/>

Ergonomic Guidelines for Manual Material Handling

This booklet is for managers and supervisors in industries that involve the manual handling of containers with a systematic approach to improve handling of containers, sacks, and bags.

<http://www.cdc.gov/niosh/docs/2007-131/>

For thorough, practical advice on preventing forklift injuries, see the 1999 NIOSH Alert, "Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts":

<http://www.cdc.gov/niosh/docs/2001-109/default.html>

(This is somewhat dated but still provides a sobering reference for the lethality of the modern workplace).

Occupational Safety and Health Administration (OSHA)

As part of the Department of Labor, OSHA creates and enforces workplace health and safety regulations.

800/321-6742

<http://www.osha.gov>

Warehousing Education and Research Council

An international warehouse managers association, WERC distributes “Warehouse Safety Program Guidelines” and has up-to-date information on OSHA regulations for managers and employees.

630/990-0001

<http://www.werc.org>

Chapter Three: Collaboration

INTRODUCTION

According to research from the Georgia Institute of Technology, only 30% of the 600,000 warehouses in the U.S. use a Warehouse Management System (WMS). With such a huge number of warehouses unable to link to their business partners, visibility throughout the supply chain (notably inventory visibility) cannot occur. A preferable goal for these “dark” warehouses, particularly in a world in which product sourcing is increasingly global, is communication and collaboration with their partners. In this chapter, we’re going to look at Best Practices for collaboration, discussing ways and options to link supply chain participants so that light is cast on those somber warehouses and 3PLs.



Note: According to some industry statistics, the most efficient distribution centers use a WMS, typically operating with 99% accuracy on order fulfillment rates.

Supply chain management is uniquely difficult because its complexity extends beyond a company’s walls and, frequently, its home country. While international sourcing and manufacturing provide an opportunity to source more economically, they create numerous challenges. When you add an international component (such as raw material sourcing and product manufacturing) to your supply chain, you often create undesirable dark spots. Your supply chain can stretch across thousands of miles, creating consolidation points beyond the manufacturing center and de-consolidation points closer to your home market. Control is not surprisingly often lost. This can be an early experience for companies after first relocating manufacturing offshore-especially to countries with a different language. Yet, across this logistical jigsaw puzzle, you still need to track inventory.



Note: Warehouses aren’t the only places where inventory resides. Hospitals, hotels, restaurants banks, government agencies, non-profit organizations and construction sites have it, too.

The classic teletype, telegrams and wire transfers that provided rudimentary communication ultimately gave way to faxes, email, Microsoft Excel and QuickBooks. While the latter applications may have proven effective in the last century, they’re far from leading edge as the end of the first decade of the 21st century rapidly approaches. None of them really enable information exchange up or down the supply chain. For the retailer with multi-warehouse requirements, or a sell-side logistics company with warehouses and stock rooms that need to maintain safety stock levels, an information chain operating in real-time is vital. When suppliers, trading partners and customers can collaborate 24 hours a day via customized, role-based access to inventory views, business relationships improve and efficiencies are realized.

Most supply chains involve more than one warehouse to consolidate, store or ship goods to market or business customers. The biggest innovation impediment is the inability to connect partners, inventory hubs, or simply internal inventory locations. Connecting business partners is even more painful should you decide to change your supply chain (move a distribution center, employ a 3PL, change your supplier or reseller channel or inventory location, for example). With improved collaboration and inventory visibility, companies have instant, multi-warehouse visibility, whether it’s across the street, in another state or on another continent.

With the global retail supply chain as unpredictable as it has ever been, as well as having been extended through to the retail shelf, companies must be flexible. The supply chain technology that previously ran warehouses and distribution centers must now reach beyond the warehouse shelf to the store shelf. With better (newer, cheaper,

automated and more intelligent) supply chain management tools, companies have the information they need to both adapt and respond in ways that were previously impossible. The result makes collaboration—even for small warehouse and 3PLs—possible. Real time tracking and global visibility helps companies streamline their operations and reduce costs, while providing improved services to their customers.

Depending on the sophistication, this collaboration ideal begins with activity at the retail store cash register.

A Future that is Demand Driven

Knowledge of what is selling through retail is almost as important to other participants in the supply chain as it is to the retailer. The concept of a demand-driven network rests with the sequence of events initiated by the purchase of an item in a retail store. The sale triggers a request to replace the item on the shelf. As the information flows backward from the retailer via the distributor to the manufacturer, this consumer demand data helps optimize the inventory levels in the stores as well as labor, inventory, warehouse and transportation resources in the warehouse.

In this sequence, the end consumer is as important to the manufacturer as the retailer. To ensure that the requisite data is passed along the supply chain, retailers need a collaborative platform between the store, the distribution center and manufacturer. This requires both the will to collaborate and the technology to do it.

MY KINGDOM FOR A WMS

Supply chain participants need to leverage the wealth of information now available at the store level and figure out replenishment plans. The planning must consider pricing and promotion data in addition to on-hand inventory levels in the store and the distribution center (DC). It also helps to have real-time or near-real-time visibility into in-transit inventory en route from the manufacturers or already en route from the DC to the stores.

How can you create real visibility that you can share with your teams (everyone who needs to collaborate in the order-to-cash cycle, for example)? How can you connect with partners, inventory hubs, or simply internal inventory locations within a dynamic marketplace? For the smaller warehouse or 3PL (those companies comprising the vast majority of the 600,000 warehouse statistic cited above) the increasing demands from customers for real-time inventory and shipment visibility usually produce a search for a WMS.



Note: Real-time collaboration can help you avoid contributing to out of stocks for your customers—the number one bane of retail stores.

Creating a “pull supply chain” that can progressively react to real-time market forces while still creating the lead times necessary for high-volume batch manufacturing upstream requires real-time inventory visibility. The notion of physical inventory in a warehouse is similar to a “push supply chain”, where decisions are made retroactively, and the true stasis of the inventory levels on the sell-side is at best an exercise in guesswork. A real-time WMS that exposes inventory levels across the supply chain allows the network to collaborate. Traditional physical inventory practices, for example, can become cycle counts that keep a real-time tab on what is really there.

Without real-time, relevant information, logistics innovations like “vendor management inventory”, “just-in-time”, “pull supply chains” become meaningless. Until now, these innovations came with a complexity and price tag that only very large companies with tight control over their supply chains, big budgets, IT staff, and time could handle.

WAREHOUSE MANAGEMENT SYSTEMS AND COLLABORATION

The nucleus of this relationship is a WMS that provides a platform for business partners to connect. The system

can provide both internal and external user access to link field employees, business partners, customers, suppliers, owners, carriers, brokers, executives, and other partners. Once given access, any of them can log in with their own unique user privileges, and access data in real time for the locations of their choice.

COLLABORATION SCENARIOS

With technology linking both data and users, this global inventory collaboration platform extracts definitive and real-world inventory location, status and flow in real-time, providing a level of visibility within and across warehouses never seen before except in the most expensive, custom and complex supply chain systems.

How can this translate into your daily life? Here are some scenarios that illustrate the benefits of collaboration:

- **An executive of a 50-warehouse 3PL can log in from home and monitor activity for the entire operation or focus on the details within a single warehouse.**
- **A broker, agent or representative with one or several accounts can use a single login to access data for one or more companies depending on what he needed to do with it. The broker could choose to view this data by a single warehouse or account, or all warehouses and accounts.**
- **An owner or product manufacturer can have their own login to monitor sales and shipments of goods outside of their distribution channels.**
- **Transportation companies can be provided login access to the customer database to learn which loads are awaiting pickup as well as see shipments they have handled in the past.**
- **A company can provide personnel with Web-enabled mobile handhelds and a web portal for their clients to remotely access their own accounts.**
- **A warehouse manager can access the day's shipments and receipts from anywhere, even while in a meeting using a dashboard gadget from an iPhone.**
- **A beverage sales rep can learn during an account visit that a certain SKU is selling more than expected and then remotely access the warehouse database to confirm that additional inventory can be added to the next shipment.**
- **3PLs and warehouses pitching a new customer can use collaboration as a selling point to generate new business. Sales reps can easily create custom demos to illustrate the benefits of real-time access to actual inventory reports.**



Note: Collaboration can be a business driver for both keeping existing customers as well as gaining new ones. A 3PL using collaboration to pitch a new business prospect interested in supplier managed inventory or pull-based customer replenishment can easily demonstrate capabilities such as permission-based inventory visibility, adaptive fulfillment, and multi-warehouse inventory planning and distribution.

THE ROLE OF SAAS IN COLLABORATION

Note: Although some of the following duplicates content from Chapter Two [Comparing SaaS to On-Premise Warehouse Management System Software], it is important to revisit key features and benefits of the hosted software (software-as-a-service) delivery model because they are so critical to making global supply chain collaboration possible.

Prior to the advent of the hosted software (software-as-a-service) model, the commercial viability of an installed, fully functional, ecommerce-enabled WMS exceeded the financial realities of most small- to medium-sized warehouses. Very popular with growing companies, the on-demand model has become an increasingly common delivery model for applications like sales support, transportation management, and even enterprise resource planning. In recent years, fortunately, the same subscription-based delivery has become available to companies within the manufacturing/distribution/retail supply chain. The same advantages of the on-demand model—access to sophisticated technology, low risk, predictable cost, and delivery across geographic or corporate boundaries—make it particularly appealing for companies looking to ramp up collaboration.



Note: The SaaS delivery model makes both flexibility and collaboration possible for the entire supply chain. If you need to quickly relocate sourcing from Asia to Mexico, for example, due to transportation cost savings, a SaaS-enabled supply chain ensures that you can move quickly to new factories, and immediately provide your new partners with the technology to collaborate.

Unlike the client-server model, the SaaS model by definition (definition meaning access anywhere you have broadband internet access) provides the perfect platform to enable collaboration spanning geographic and corporate boundaries. Companies can easily implement and integrate additional sites to gain enterprise-wide warehouse visibility and management without adding incremental IT infrastructure and hardware costs. By simply adjusting security and permission configurations, warehouses can instantly integrate and manage information flow within their own organizations and federated trading communities. This unique ability creates an adaptive supply chain for future pull or market driven innovations like mass customization, or dynamic sourcing.



Note: SaaS WMS delivers flexibility and low cost that traditional enterprise software cannot provide, and with the SaaS model visibility is a natural by-product that enables collaboration to be effective.

Unless there is a need to integrate legacy systems, there is no need for physical point-to-point integration between warehouses. The key is to provide a modern, secure Internet architecture that ensures connectivity to other systems (e.g., ERP and CRM), as well as warehouse inventory data in both pushing/pulling scenarios. The result of native EDI and flat-file integration, for example, is a manufacturer that can now share sales and purchase order and fulfillment information with customers and suppliers.



Note: As a proof point, SmartTurn customers have integrated their SmartTurn SaaS technology with everything from QuickBooks and SAP, to custom in-house procurement and Web storefronts.



Note: Software-as-a-service is environmentally friendly. Everything involved with software installation and maintenance is eliminated, including paper manuals, transportation, and dedicated on-premise servers.

TAPPING THE SOCIAL NETWORKING TO EXTEND COLLABORATION IN A WAREHOUSE OR 3PL

Tapping the SaaS model enables companies to collaborate near and far. Adapting Web 2.0 or social networking technologies to WMS 2.0 supply chain management technology extends this collaboration even further.

As the Internet became our ubiquitous communication platform in the past decade, a participatory culture arose. The Web 2.0 or social networking movement blossomed and it is now hard to imagine living without Internet connectivity, or reading and sharing information via web sites such as Google, Facebook, and LinkedIn. The social networking tools and behaviors that characterize, in particular, modern communication between teenagers can also be applied to the supply chain.

WMS 2.0 supply chain technology in today's warehouses are connected to factories, distribution centers, and web storefronts, requiring modern technologies to support the Web-based "experience economy". A nascent concept within the supply chain, this new approach leverages secure information sharing, and Web 2.0 functionality to further extend collaboration opportunities.

What does this enhanced collaboration look like? First, access is available through a wide variety of technologies and interfaces. Business owners, warehouse teams, trading or logistics partners, or even customers can access data and communicate through a web browser, Google Gadget, or an application (such as SAP, Oracle or QuickBooks) that they already use. Large enterprise software companies call this SOA (service oriented architecture).

Cost and complexity are minimal since users can selectively share information through a visual or web interface with customers and trading partners. Users can view or share inventory and warehouse metrics with everyone in their organization, as well as customers and trading partners. Permissions can be easily set so that inventory information is available anytime anywhere. By adding gadgets onto desktops and smartphones, collaboration is extended far beyond an office PC.

Collaboration and Security

How does security fit into a SaaS-enabled world of collaboration? Essentially, you need different layers of security to control data access. Much of it will be rules and policy-based, depending on who needs to see what. Your IT department or staff will play a huge role, notably in the role of managing user access and privileges. Strong policies on account setup and termination must be maintained. You will provide various privilege levels to users that will vary widely. You may give permission, for example, to someone to see everything in one warehouse while restricting their access to inventory data in another warehouse. All account login access must have encryption through SSL including user name and passwords. Controlling this access to information is an on-going critical issue.



Note: Controlling user access and managing access privileges are two of the most important issues in maintaining data integrity.

CONCLUSION

To meet distribution requirements amid the ever-changing needs of the marketplace, real-time visibility is essential. By combining the ubiquity of Internet connectivity with a SaaS-delivered WMS, organizations can uncover the dark spots in their supply chain at a cost and efficiency value curve that allows for rapid change and adaptability to changing market pressures.

Through collaboration, manufacturers, distributors and retailers can balance inventory carrying, order fulfillment and transportation costs so that each company can achieve their respective strategies while maintaining the agility to quickly respond to the dictates of consumer demand.

Chapter Four: RF Mobile in a Warehousing Operation

INTRO

If your role in the supply chain is to have stock immediately available to meet your customers' needs, then it is time to take a closer look at best practices for RF (radio frequency wireless).

As a distributor or 3PL, know that RF technology advances are now at the forefront of internal operational improvements in wholesale distribution. RF is a mature technology and has been implemented in thousands of facilities. There is little question, therefore, that the modern warehouse is wireless, incorporating paperless receiving, putaway, picking, shipping and inventory counting. (According to Pembroke Consulting, well over 2/3rds of industrial distributors already use wireless local area networks).

In this chapter, we're going to look at how to use RF in your operation to respond to the not uncommon scenario in which your customers demand almost 100% order accuracy (often comprised of smaller and more frequent shipments) at the same time that you're asked (by management or ownership, or your lenders if you're the owner) to increase productivity and reduce costs.

Cost reduction is key because an analysis of your labor costs will likely show that picking and packing are two of the most labor intensive and costly jobs in your operation. (This is certainly true if you're picking and packing without the aid of automation). Does the following description characterize your operation? "At each step, employees record items, quantities and locations on paper." This type of manual picking and packing is a primary source of errors, expense, and decreased efficiency. Replacing paper and pen by integrating wireless automation into your operation should produce improvement in all three areas.

WHY WIRELESS

While it is possible to address errors, expense, and decreased efficiency in other ways, RF automation could be the right solution for you.

Productivity improvements materialize from substituting technology for potentially error-prone human activities such as order processing, inventory control, or picking. Data can move directly from the warehouse floor into your business system rather than by manually counting and recording and entering information into the system. Information from hand-held wireless scanners provides real-time stock information and can even eliminate the need for manual inventory counting (explored in chapter 14).

To make data continually available to employees whenever it is needed reduces lapses in productivity and virtually eliminates wasteful trips to a stationary terminal, docking station or dispatch location to grab pick or putaway instructions. If two pickers can do the previous work of three pickers, then your picking productivity has just jumped 50%. If this means that your picking accuracy increases from 95% to over 99%, your customers will be happier.

The benefits of happier customers and avoiding the costs of correcting mistakes will appear on the bottom line. If this is what you want, the next step is to determine just what level of automation is appropriate for your needs.



Tip: Make your wireless implementation a business project, not an IT project.

WIRELESS STARTS WITH A BARCODE

The bar code is the heart of the modern warehouse or distribution center. Barcodes help identify items when they

arrive, when they are later picked to fill orders and shipped out, and when they are counted during cycle or annual physical counts. The best way to capture and manage the information on these barcode labels, particularly if you want to quickly and accurately ship thousands of items, is with RF technology.

Using RF barcode scanning to capture real-time data and send it wirelessly to back-end operations, financial, and customer service systems is the standard for today's warehouse. While simplicity is one of the key reasons, RF networks also offer great efficiency by enabling warehouse employees to interact with the system directly from the point of activity.



Note: While we're deliberately focusing on barcode-reading RF applications, there are other RF-enabled applications such as wireless VoIP solutions.

UNDERLYING TECHNOLOGY

An RF network essentially extends a wired local area network into the warehouse space where the data is collected. Networks are fairly simple, having only three primary technology components; a mobile RF scanner or terminal, an access point or base station, and a network controller connected to a server holding some kind of database application. The location and number of access points depends on a variety of factors, including the warehouse size, product composition, cabling, interference, racking design and layout. The exact number of access points is determined by a site survey (which we discuss later in the chapter). With the access points in place, users communicate with the system with scanners that link the warehouse employee and the RF system. Data is usually entered either by scanning barcode labels or by using a keyboard or touch-screen.

BENEFITS

RF wireless systems are increasingly common because the advantages generally far outweigh the initial costs. As companies become more experienced and adept using the technology, these increases in productivity, inventory accuracy and order visibility progressively reduce overall costs every year. Here is a laundry list of what you can gain:

■ Greater Efficiency and Throughput

With a streamlined paperless wireless system, you should also be able to track barcoded products from receiving, putaway, and picking, to packing, shipment confirmation, and cycle counting. These greater efficiencies should allow you to handle more orders during peak periods.

■ Increased Storage Capacity/Greater Flexibility in Inventory Allocation

With greater picking, packing, and putaway flexibility, you should be able to escape the clutches of fixed inventory allocation by moving to a random storage model. Putaway can become based on the specific space requirements for each product, something that will boost your space utilization and increase the percentage of your potential storage capacity.

■ Lower Head Counts (Permanent and Seasonal)

By employing automated data capture, you can immediately reduce the number of employees who were previously doing redundant manual data entry. You should also be able to reduce seasonal or temporary labor costs by providing novice pickers with more accurate and intelligent routing/pick lists that will greatly increase productivity.

■ Faster Employee Training

By relying on the system accuracy and ease-of-use of RF terminals, you should be able to train employees faster. This is especially important if you use a temporary workforce and loads of overtime to meet seasonal or demand peaks.

- **Greater Data Entry and Accuracy**

Barcode scanners liberate users from the limitations and errors of hand recording which requires printed reports and unnecessary data re-entry. With multiple processes available within a single application, the user is able to accurately complete tasks in a timely fashion.

- **Faster Inventory Counts**

Counting is faster because errors have previously been eliminated and safety stock levels reduced (due to the confidence of having more accurate real-time inventory data).

- **Faster Error Correction**

Depending on your Warehouse Management System (WMS), warehouse staff can obtain real-time feedback, which enables problems to be confirmed and investigated quickly. For instance, if too much product arrives from a supplier, exceeding the purchase order, the system can alert the buyer or receiver that it is invalid. The extra cartons can be immediately set aside or refused.

- **Reduced Travel Time by Warehouse Personnel**

Wireless can help reduce travel time for warehouse personnel by enabling companies to distribute work to individual employees by zones.

Sounds good, doesn't it? Many points in the supply chain can realize important advantages of accurate, real-time data. RF is certainly one of the warehouse improvement projects you can make with a higher than average investment/return ratio. Let's look closer now at some specific warehousing operations where RF can be applied:

WAREHOUSE AND 3PL SCENARIOS

Receiving

Most businesses (certainly 99% of the SmartTurn blog readership) receive products or shipments. The products or goods to be received can range from incoming raw materials and components and daily consumables (think of hospitals, restaurants and light manufacturing), to products ready for retailers' store shelves. Regardless of the type of business, there is a general receiving process common to each scenario: the receiving company must track/count delivery of the goods, update their databases and financial/accounting records, confirm with the shipper that the order arrived and then initiate some kind of payment process.

Integrating RF into this sequence provides significant advantages over the paper-based environment that has existed since even before the Dutch East India Company ruled international trade. An RF-enabled employee receiving a carton can quickly scan the barcode, sending this information (part and PO numbers, and quantity) to the database, where the item is noted as received. At virtually the same moment, the quantity received can be compared with the quantity ordered to immediately determine if there is any disparity. If a disparity exists, or the goods are damaged, immediate action can be taken. This sequence would typically take just seconds, immediately after removing the carton from the trailer. The carton is rapidly processed and forwarded to its destination, whether the warehouse, production department or shipping/staging area.



Note: RF-enabled receiving makes cross-docking much easier to implement.

Putaway

RF increases the number of putaways processed per hour. Real-time access to product information enables companies to implement flexible putaway and storage. Employees can receive dynamic instructions on pallet and bin locations, optimizing warehouse space and workers' time.

Inventory Management

Once the goods are put away, they become inventory. Anyone with more than a year in the warehousing industry is likely familiar with the drudgery that is the laborious task of physical inventory. Using sheets of paper and pencils is both inefficient and inaccurate. In contrast, the RF version of inventory management is much easier to perform, faster and nearly eliminates human error. Because product movements have been recorded in real time, RF systems provide accurate, real-time inventory information with the current inventory data available. The result is huge time savings over manual paper counting/data entry systems. Just think of the time difference when grocery shopping for the checkout clerk to either scan a product bar code or manually type it in.



ROI: By implementing an RF system in combination with a WMS, you should be able to eliminate the annual inventory count and much of your cycle counting activity.

The non-wireless/classic inventory scenario requires employees to count (some cynics might say interpret) part and stock numbers and then mark them and the respective quantities on counting sheets. The much more elegant RF scenario has the employee scanning an item's bin or shelf label, and then either manually counting the quantity or scanning the each item within a bin. One key result is that you can generate inventory reports much faster and identify discrepancies.

The benefits of faster and more accurate inventory data pays off for both customer service and sales, as well. Service and sales reps can do quick inventory checks and notify customers (with much greater confidence) that what they are ordering is actually available for shipment. This eliminates the frustrating requirement of having to either call down to the warehouse to confirm product availability or check it personally.



Note: An RF system allows stock retrieval and replenishment to be combined, reducing the number of movements involved in the internal transport of material and the number of empty runs.

Picking/Order Fulfillment

RF scanners increase picking speed and accuracy as well as improve a wide range of picking principles, including individual selection, and batch selection. With efficient pick/putaway assignments in hand, employees are directed to correct storage locations in the warehouse. Once there, they can confirm the correct item has been picked, and from the correct location. A WMS with location-based features and functionality uses picking activity and order status data to generate pick lists optimized according to the pick policy including zone, aisle, location, customer and employee. This significantly reduces the distance and length of time to pick items.



ROI: Combine RF with on-site bar code printing. You'll reduce data entry problems and save employee time because they will be able to do on-the-spot printing.

Shipping

Shipping problems generally increase as warehouse throughput or volume rises. They also generally increase in proportion to the number of product codes and serial numbers that employees must copy as items are removed from or loaded into trucks. RF communication enables employees to record the shipment of the item by simply scanning the item's bar code.

YOUR OWN RF IMPLEMENTATION: SOME THINGS TO THINK ABOUT

Integrating RF automation into your operation by moving your operation from a completely manual system involves more than just installing an RF system. It also involves a process learning curve for the employees who will operate the equipment. Make sure that you include training in your project planning. While training should be fairly quick, there are process changes (call them improvements) that you will have to implement.

CONCLUSION

To have access to accurate real-time at all times means that there is no productivity break. Employees will no longer have to make “deadhead” trips to a stationary terminal, docking station or dispatch locations to receive pick or putaway. You’ll be able to make critical decisions faster and take action at the point of activity. You can do more, faster, with less wasted time and without adding additional employees.

The relatively low cost of a wireless LAN has encouraged adoption by both large and small companies. If you’re interested in joining, we invite you to read the next chapter in our series. We’ll look at Best Practices for Setting Up an RF Network, discussing the options and steps to ensure your experience is successful.



Note: Implementing technology and automation has to positively impact your customers. Greater efficiency for you, while negatively impacting your customers—regardless of whatever your gains—may ultimately make this a losing proposition.

Chapter Five: Setting Up a Warehouse RF Network

INTRO

Why go wireless? Consider that more than one in five wholesale distribution employees work in the warehouse. Some companies have saved hundreds of thousands of dollars in annual labor costs (through both full-time and seasonal labor savings) after implementing an RF (radio frequency) network.

In the previous chapter, we looked at the business rationale for implementing an RF network in a 3PL or warehouse operation. The opportunity to save on labor alone makes RF worthwhile. In addition to labor reduction, we looked at many other benefits, arguing (a position already clearly shared by thousands of companies) that the pros for moving forward with RF far outweigh the cons. In this chapter, we're going to look at the actual implementation process. How do you actually replace paper with RF? What do you need to think about? What are some of the gotchas that can trip up an implementation project?

A final comment before we begin; depending on the size and sophistication of your company, you'll want to make the RF implementation a cross-functional project. Don't expect (or allow) one part of the company to own it. Create a cross-functional team to determine the overall plan, choose the appropriate technology and manage everyone's expectations. Select someone from outside IT as team head.

SEEING THE BIG PICTURE: AN INVENTORY OF YOUR WAREHOUSE AND EQUIPMENT

One level down from the big picture is the warehouse. (For the purposes of this discussion, we'll assume a project to install a RF network in one medium sized warehouse).

YOUR WAREHOUSE LAYOUT

Barcode systems are heavily transaction-oriented and any connectivity interruption can produce data loss and error. In the typical warehouse, there are many ways that bar codes can be scanned and there are countless potential obstructions (from walls and poles, to metal and operating temperature) that can attenuate wireless signals. Warehouse layout and your choices in providing RF coverage within this space will dramatically affect transmission consistency and reliability. A wireless implementation project, therefore, begins with an analysis of warehouse design and layout, in which system designers obtain information on coverage, equipment placement, power considerations and wiring requirements to ensure that RF signals remain accessible to warehouse employees.

Rack Flexibility and Density

When deploying a wireless LAN within a warehouse, you'll likely run into RF coverage problems, many of which will be due to racking. Racking (materials, placement, and density, etc) is in fact the biggest issue with warehouse RF. Metal shelving racks (as well as metal support beams and the continually changing numbers of items on racks) reduce radio signal propagation and pattern consistency, decreasing reads and accuracy. As the number of items on shelves constantly changes, coverage holes may be created or closed, producing sporadic connectivity loss that can seriously frustrate employees.

The more packed together the racks, the harder it will be to propagate clear signals to every point a barcode scanner could be used. The more pallets you store, the more (meaning closer) access points you'll have to install. A density of one pallet every six square feet obviously requires more wireless access points than a density of one pallet every eight square feet.

The easiest way to address coverage holes and ensure full coverage in all warehouse areas is to install additional access points. Additional help can come from having a flexible rack layout in which you can modify pick levels and locations.



Note: Your access points will probably be staggered throughout the building on about 100 ft to 150 ft centers depending on rack density.

WHAT BAR CODES ARE YOU USING?

What barcodes are you going to use? Barcode is a long-established technology and standards exist. Although most handheld scanners can read multiple barcode symbologies, it is still important to coordinate and confirm with your warehouse management system (WMS) vendor (and your customers) that everything from the scanners and barcodes, to the printers and WMS is compatible.



Tip: If you receive shipment from companies, they may already have their own barcode standard that you can use. Check with them if you are thinking of matching their technology.

THE TECHNOLOGY SEQUENCE: SELECTING WHAT IS RIGHT FOR YOU

Selecting the right technology depends on many factors, ranging from your budget, to the type of lift equipment you use. You need to consider the work environment and what you really need. Spend some time at difference hours of the workday in the warehouse to observe how employees do their jobs currently and how they will likely do them when equipped with RF scanners. Here are some of the issues to consider:

- **Do workers wear gloves?**
- **Do employees need to have a keyboard to enter data? (How much data will they have to enter?)**
- **How large do the scanner keys need to be?**
- **Will you need scanners that can resist abrasion and contact with chemicals?**
- **Will the scanners need touchscreens?**
- **Will they be used in direct sunlight? Can screens be read at different times of the day?**
- **How important is processor speed? Are you willing to trade off faster processor speed for shorter battery life?**



Note: Select equipment that is appropriate for your warehouse environment. Consider ruggedized terminals if your environment is harsh. Harsh? Think damage from harsh chemicals, abrasion, and temperature extremes, etc.

When it comes to scanners, you essentially choose among three types: handheld, hands-free and vehicle-mounted.

Handheld Scanners

These are battery powered and carried or worn by employees who move frequently, either on foot or riding some kind of lift vehicle.

Hands-free Scanners

These devices are worn on the arm or around the waist, freeing the employee to work. A common task when wearing these is picking. Scanners worn on the arm are usually equipped with a screen and keyboard.

Mounted Scanners

Vehicle scanners are powered by the vehicle's electrical system, usually more robust, harder to drop or damage and certainly harder to steal. They are appropriate when the operator remains close to the forklift but you do lose the flexibility to pick from the floor. RF scanners can be mounted on forklift trucks for pallet movement with handheld units for on-foot transactions e.g. inventory, picking and cycle counting etc.



Tip: Don't forget to budget for the cost of mounting the devices to forklifts.

Wireless Access Points

You're probably very familiar with Wi-Fi networks, either at work or at home. Networking access points are very similar to the wireless router in your home. Designed for installation on shelves, ceilings (the most common location in warehouses) or walls, access points connect the network of RF scanners or terminals to the wired physical computer network. The backhaul to the central database is enabled through a hard wired connection.

Industrial versions are typically ruggedized with sealed enclosures to protect against environmental threats such as dirt, moistures and chemicals. They are designed to deliver reliable connectivity with interference avoidance, as well as coexist with other RF networks. Multiple access points can be overlapped to ensure full coverage of the warehouse layout, penetration of obstacles and high-speed roaming.



Tip: Don't stretch RF equipment to its maximum range. Use an appropriate margin of error to ensure that you provide 100% coverage

NETWORKING CONSIDERATIONS

What type of network will work best for your situation? You're going to want a spread spectrum or wide band system network. There are a number of frequency options (900MHz, 2.4.GHz and 5GHz). You can use centralized or distributed architecture and you'll undoubtedly use some flavor of the 802.11 standard.

RF-based 802.11 standards dominate the current installed base of wireless LANs. Regardless of which kind (a/b/g/n) you use, they each provide sufficient data transfer speed for most RF data capture applications in warehouses and distribution centers.

SPREAD SPECTRUM TECHNOLOGY

Spread spectrum or wide band system operate in a variety of bands (902-928 MHz, 2.4-2.48 GHz, and 5.725-5.850 GHz). These medium range (100 to 1,000 feet) systems are significantly faster than narrow band transmissions, with

the 2.4 GHz systems offering comparatively greater bandwidth and support for higher data rates exceeding 11 Mbps.

SECURITY

You can't discuss wireless networking without a few words about security. Not everything accessible through your wireless network is a corporate secret. You must evaluate what needs to be protected and to what level it needs to be protected. You need to understand system and security vulnerabilities. A competent systems integrator can help you with an initial evaluation, after which a good network security administrator can maintain and update the security protections you've selected. Numerous third-party firewall, encryption and authentication products can be used in conjunction with 802.11-standard technology.

RF TESTING/SITE SURVEYS

The number of access points you deploy should be based on a site survey or test (and not your intuition or best guess). A site survey is an RF study to determine whether a warehouse has unusual interference issues. Testing will confirm how signals behave inside your facility's concrete walls and steel doors. It serves as a guide for the network design, installation and verification of the wireless communication infrastructure, and helps you calculate your equipment needs.



Note: You can do a site survey yourself. However, we strongly recommend that you have someone experienced handle it. In addition to helping determine optimal locations for access points, a competent site survey will help you secure accurate quotes on equipment requirements, thereby helping your project budgeting.

Make RF testing as realistic as possible. Don't think of testing as a single point in time prior to submitting your initial equipment order. To ensure that RF coverage meets your needs (and the changing realities of your warehouse operations), consider regular testing. What is regular? Twice a year tests in which you measure RF scan performance (particularly) low to the ground near the lowest shelves.



Tip: Once your RF system is operational, periodically ask employees whether they are experiencing any problems when sending data.

THINGS (AND A FEW GOTCHAS) TO THINK ABOUT

Who is going to do it?

Who is actually going to do all of the work? Who should design the system? Is it worth your time to sufficiently educate yourself about RF technology to implement a system yourself? Do you have someone on your staff who can do it? Is your brother-in-law an expert? Most businesses concentrate on running their businesses and lack the time, personnel and expertise to handle an RF installation project. A commonsense response is to find a technology solutions provider or systems integrator focused on the 3PL or warehouse industries that has a deep understanding of RF technology. If you're going to look for an outside vendor, look for a knowledgeable IT and data wiring vendor. Look for someone who can design a system (and provide you in advance with a nice CAD drawing of the project) and procure the necessary hardware and software, including IDF cabinets, access points, and cabling needs. (It almost goes without saying) that they should know the specs and operating ranges of every piece of recommended

equipment. You might want to do some research with companies in your area that have already made the wireless jump and investigate any vendors they recommend. Avoid vendors that just want to sell you hardware.



Tip: Confirm that the vendor you really want to use is profitable. You want that company to remain in business for years to come so they can support your hardware and software.

You can start slowly

Although implementing an RF system probably represents less work than other potential warehouse process changes such as cross docking or an automated sortation system, you might want to start slowly. You don't have to bite off everything at once. Instead, you can deploy RF progressively, starting with one function or area, such as the receiving dock to welcome incoming shipments. Eventually, and probably faster than you can imagine, you can expand RF to the other areas of your warehouse. Of course, the alternative is true; you can just jump right in and do everything at once.

Is your WMS RF-enabled?

You are using a WMS, aren't you? Does it support input from RF terminals, or does it only interface with wired devices? Barcode systems are transaction-dependent. Connectivity loss during a transaction can cause errors. Depending on the WMS programming, sporadic connectivity may or may not be a problem.



ROI: You'll need a WMS with wireless capabilities to maximize the benefits of real-time access to shipping and inventory data

HOW IT WORKS WHEN IT IS WORKING

The vision of a wireless warehouse is already here. It may take a leap of faith on your part to envisage your warehouse being RF-enabled but there is no reason why your workday can't take place amid RF communication, automated data capture, handhelds and lift truck-mounted RF scanners, and streamlined shipping and receiving procedures. Shipments will arrive, become part of your inventory and then be shipped out seamlessly. RF tracking will almost eliminate paper in the warehouse.

When your WMS and wireless are working happily together, paper doesn't necessarily become completely extinct but every quarter, you should be ordering increasingly fewer reams, pens and pencils. The WMS will help you direct and manage the picking, packing and shipping processes. Picking directions and data will be distributed to warehouse personnel on their mobile devices. Without having to return to the office to pick up directions, employees will receive the necessary information to know where to go, what to pick, how many to pick and what to do with it.

Here is how this picture might look: your network backbone is a wireless local area network (with 802.11 connectivity) that utilizes a sufficient number of wireless access points spread out over the facility. The employees have been appropriately trained to use the handheld scanners and lift-truck mounted devices. Information is distributed quickly to the warehouse floor. Things get done. You make more money. You even get a raise.

CONCLUSION

Incorporating RF into your warehouse operation may seem daunting, but the benefits should considerably exceed any perceived risks. Most, if not all, of the leading companies in the 3PL and warehousing industries already use RF

networks in their warehouse and distribution centers. This is proven technology with well documented benefits. With proper preparation, and smart decisions about vendor support and technology, your company and customers should love the results.

Chapter Six: Receiving

At its most fundamental level, receiving is the process of confirming that you received what you ordered. Does the material received match your purchase order? Do you place it in your warehouse quickly?

When you consider that the average warehouse receives, counts, and inspects thousands of items of varying shapes and sizes from hundreds of vendors whose picking, packing, and shipping practices are all different, it is not surprising that receiving can be one of the most complicated functions and warehouse processes. Errors in receiving, unlike most other errors in your warehouse, have a ripple effect. If you can't get your receiving process working smoothly, you'll run into near-future scenarios where product will be sitting on your receiving dock, or on pallets in a corner. Your pickers will waste time looking for them.

If you think my emphasis on the importance of receiving smacks of hyperbole, consider this: data from your receiving department determines what your accounting department pays vendors. If receiving doesn't highlight when pallets are missing a few cartons, you will overpay for the actual goods received as well as incur backorders. If the received items differ from what was expected, you'll unnecessarily expend time and money to correct the problem.



Note: Success or failure in receiving determines what you pay for your receipts and their errors can be very costly.

Everyone working on the distribution team should understand that outbound success and efficiency depends on the success of inbound efficiency and performance. (This is particularly important if you are talking about receiving and processing returns). Ideally, the best practice on receiving is to move items to their storage location with as few touches - few movements and barcode scans, etc. - as possible.

Good receiving is critical because when you move product faster with fewer employees, employee productivity is higher, you use less warehouse space, and you reduce the number of touches on items, which reduces opportunities to inadvertently damage them.

Will Work for Labels

Good receiving starts with good labeling. Get your suppliers to correctly label materials before they arrive at your warehouse. Make sure the labels can be read by both human and data capture devices. It goes without saying that you need to ensure that your warehouse has the proper data scanners in the receiving locations where you need them.

Depending on your receiving system, the labeling standard you use and your vendors' willingness to customize printing for you, here are some of the data that you may want to include on your labels:

- **Shipper/supplier information (company name, tel. number)**
- **Purchase order number**
- **Pallet labels and quantity**
- **Case labels and quantity**
- **Product number and description**
- **Package count**

- **Part/unit labels or markings (each item in the case should have a unique product ID)**



Note: With labeling, stick with an industry standard. Vendors will be more likely to comply or, better yet, already use one of the standards with some of their other customers. In this case, your request will be easier to meet.

An effective labeling component of your receiving system also includes a well-labeled warehouse. Identify areas, aisles, rack bays, and shelves with large, easy-to-read location labels. Use large barcode-readable “license plate” labels viewable from 30-40 feet to identify warehouse locations. Create and adhere to some rigid labeling policies in your warehouse and you will reduce your error rates. Here are a few of the policies which will help you:

- **Require that vendors (or your staff) label every case and pallet to identify it.**
- **Scan the label to confirm that you are moving the correct product.**
- **If products are not labeled by your supplier, you need to enable the receiving team to handle printing on your end. This means having the correct information, and output devices so they can print and apply the labels as needed.**
- **Mark all storage locations.**
- **Replace damaged location tags.**
- **Make sure labels are readable when shelved. Train putaway staff to shelve with labels facing outward.**
- **If you remove items from cartons or change their location or quantity, print new labels with the updated information.**

Sure, the above ideas are all good ideas. Good ideas mean nothing if you don’t implement them. When it comes to labeling, you need to build good relationships with your vendors

Vendor Compliance Standards

Before a shiny new and correctly labeled carton ever arrives at your warehouse, you need to collaborate with your vendors and map out a plan for efficiency and success.

Your vendors can help or hurt you. How your vendors ship product to you strongly affects the fate of your receiving operation and even the profit of your company. For example, when a shipment arrives requiring extra handling, its receipt is slowed and you have to spend extra time completing the process. Your profit decreases while the chance of a receiving error increases. Consider these time-wasters; do your vendors ship multiple items in one box? How much extra time do you need to account for so that someone in receiving can open a box, sort the items, count and rebox them?

Vendors’ shipping decisions can really impact your business. Consider the following examples:

- **Has a vendor ever used the wrong freight method or carrier? (Given the crazy rise in diesel costs since the start of 2008, the wrong freight method can find its way to your bill in the form of fuel surcharges)**
- **Do your vendors pack multiple items in a single carton?**
- **Do they omit packing lists with their shipments?**
- **Are items incorrectly packed or marked?**

- **Has defective or damaged product ever arrived at your warehouse?**
- **Are shipment counts incorrect?**
- **Have vendors ever missed delivery dates?**

Too many “yes” answers to these questions and you’ll find your gross margins shrinking and your profitability drying up.

Sure, it takes time, effort, discipline and two-way communication to develop - and refine - a system with your key vendors. You are the customer and you have to set the standards and compliance procedures. You also should aim for a system that you can apply to all of your vendors.



Tip: As a standard of compliance, specify to the vendor how you want to receive the product (pallets, cartons). Make sure your Warehouse Management System (WMS) can accommodate various units of measure for each product.

Create, adopt, publish, and enforce vendor compliance procedures internally within your organization as well as with vendors. Decide the details (how, what, and when) and require vendors to sign off on your playbook. Some of the things that you may want to specify include: Request that vendors label the outer carton with the PO number, product or style number, carton count, and bar code. Request that vendors add pallet tags that be easily scanned to identify pallets, boxes or individual products. Figure out what you want and formalize it in a written document. For example, if you want single-SKU cartons whenever possible, specify this in your manual.

Think of your compliance procedures as an End User Licensing Agreement. Every consumer software user has experience clicking on a button acknowledging that they have agreed to whatever terms of use agreement a software developer has created. Obtain written acknowledgement from vendors that they have read and will adhere to your compliance procedures. Part of your procedures should include details on the penalties and remediation steps should things goes awry. This includes creating and instituting a charge-back program that is acceptable to both you and your vendors.

Things will go awry so you must document repeat problems. Is the vendor shipping you goods without a purchase order? Are you continually receiving defective items? When orders are imperfect, you need to record the invoice number, the non-conformance issue, and the shipment quantity.

There are a lot of scorecards in life and you should be regularly tracking your vendor’s performance or lack thereof. If they fail to follow the mutually agreed upon procedures, you need to track and record shortcomings. Work with vendors to solve problems. If they are reluctant to improve and unwilling to eliminate or otherwise reduce the error rate, you might just have to fire them. Remember, you are in business to make money; not throw away some of your gross margin because a vendor isn’t doing what they agreed to do.



Note: Vendor Quality Tracking

You need to make vendor quality assurance a regular practice. One idea is rank them on a dependability scale. Knowing that certain vendors will be less dependable, receiving staff will be able to give their shipments more attention.

Receiving Technology Options

Receiving in modern warehouses assumes that you have a warm and pleasant relationship with technology. If your current and projected business volume calls for it, the only thing stopping you from integrating technology is your capital investment budget. The technology blueprint that you ultimately install, from docking technology and material handling equipment, to data entry and data management systems, should be both flexible and efficient.

For example, while I'm assuming that you have the basic ability to scan bar codes (on pallets or in cartons), you should also have the flexibility to capture different common bar code conventions. Radio Frequency (RF) terminals and systems have evolved at a rapid pace in recent years. Prices have dropped sharply and you have a wide variety of basic as well as advanced options for scanning readers and transmitting stations. If you aren't currently using wireless, you might want to revisit next year's capital budget and see if you can insert a "system upgrade to RF" line item. Label printer prices have similarly dropped. You can buy lightweight portable printers and distribute them throughout your warehouse so staff can print on-demand and avoid returning unnecessarily to the office. Your material handling technology can range from basic equipment like lift trucks and pallet jacks to fully automated systems comprised of customized conveyor systems, automated guided vehicle and storage systems. It all depends on your operations and budget.

While I've talked a lot about capturing data, you'll need a system for managing and sharing it. Warehouse Management Systems have dropped in cost as their functionality has risen. Some of the things to look for in a WMS as far as receiving are the ability to:

- **Receive against multiple purchase orders simultaneously.**
- **Receive by purchase order, by product, or without a purchase order.**
- **Assign inventory to a location for put-away.**
- **Store products in unique or multiple locations based on bin/inventory characteristics.**
- **Update inventory levels automatically upon receipt.**
- **View receipt details for single receipt or all receipts from a single vendor.**

How to Implement Receiving Best Practices

So how can you emulate companies that you've read about in the trade magazines who seem to have their receiving act together? First, understand that your main receiving priority is to move cartons and pallets as fast as possible from trucks to the storage areas in your warehouse. Every stop, every move, and every item that your staff places in a temporary staging area requires space and time. The opportunity for product damage, difficulty in locating stock, and errors all rise as do your labor costs.

Paperless tracking management and communication is the most accurate, error-free method of receiving of goods into your warehouse. Anything that you can scan or communicate electronically in the receiving operation (with as little human data entry as possible) will magically appear on your company's bottom line. To maximize "electronicification" of your supply chain, analyze each step that brings your received goods from the truck to the storage shelf. Begin with your labeling process. While it may sound exceedingly simple, the rewards of reduced receiving time and errors are excitingly high.

A good way to reduce many bottle necks in your warehouse is to optimize the physical layout. Design the space to account for:

- **Receiving locations designated for tracking product.**

- **Organized use of dock, receiving and staging spaces for putaway.**
- **Sufficient space when and where bottlenecks occur.**
- **Delivery capacity. Do you have enough bays/doors?**
- **Dock door levelers.**
- **Availability of conveyors (if your automation system requires them).**
- **Availability of pallets for receipts and the material handling equipment to move them.**

Think about scheduling your deliveries at times when your order picking operation is quiet, rather than at peak periods. Discuss this option with your parcel and full truckload carriers. When shipments arrive, inspect them immediately. You'll find it easier to fix problems rather than wait. If there is damage and the driver is still on site, you'll have a witness from the delivery company or vendor. Make sure the quantities on the shipping list match the invoice. Also, it is a good idea to have a special area for incorrect shipments. You may not be able to easily read carton labels, for example, and have to revisit them when the receiving rush is over for the day.



Tip: If you think there will be any confusion about receiving items, include photos in the paperwork so that staff can more easily recognize and identify them.

Once you've designed or redesigned your warehouse layout, installed the necessary hardware and software technology, trained your staff appropriately, and created procedures with the (enthusiastic) participation of your vendors, you'll discover that effective supply chain management leans heavily on proper delivery scheduling. If you want to optimize your labor and physical resources — and reduce congestion in your delivery areas — schedule as many receipt deliveries as you can. Collaborate with vendors so they will send you advanced shipping notices (ASNs). Using ASNs will enable you to manage your shipments and potentially implement more sophisticated receiving and shipping operations like cross docking.

Hit Singles Before Home Runs

You're not going to get it right without a bit of trial and error. If you've read the other chapters in our Best Practices series, you'll have learned that warehouse management is a never-ending process improvement slow dance. (An extended Stairway to Heaven remix if you prefer). Receiving is an area where benchmarking and productivity measurement are particularly important. To begin correcting your receiving problems, you have to identify them, their source (particularly if the problem is caused by one or more of your vendors), their frequency, and — most painfully — the amount of money they are costing you. Think of receiving inefficiency as a profit strainer; your margins steadily passing through the holes in drops and streams. To plug them, start tracking productivity using benchmarks. Some of the ones you might track are:

- **On-time receiving**
- **Vendor quality control (quantity, labeling accuracy, etc.)**
- **Worker productivity**
- **Units received (can be tracked per hour/day/week/month).**
- **Receipt to putaway time**

Chapter Seven: Slotting

Your warehouse is a limited resource environment. You have a finite amount of people, equipment, products and available storage space. Slotting will help you make the most of the cubic space you have.

At its most basic level, slotting is the series of tasks that precede the decision of where to put away inventory based on space available within your warehouse facility. Who benefits from better slotting? Any organization that needs to improve resource management, increase shipping performance, respond to seasonal variances in product shipping, or optimize a limited number of pick faces. Good slotting practices are a prerequisite for optimal picking. You'll optimize space utilization and minimize the time and effort required to efficiently receive and store incoming products.

SLOTTING BENEFITS

When you optimize the storage of goods in your warehouse through slotting and reslotting, you'll increase productivity and greater facility throughput. Two critical components to this optimization are the locations where products are slotted and the distance people have to travel to pick them—especially when it comes to fast-moving items. Do a few products account for most of your workers' visits to the pick face? Do their visits spread across a wide number of bins? The more your inventory activity is concentrated in fewer SKUs, the greater the benefits of slotting improvement. You'll be able to reduce operational (especially labor) costs and increase facility throughput without adding personnel.

Let's look at some specific slotting benefits:

REDUCED LABOR COSTS

This is critical. According to industry insiders such as Tom Singer, author of the DC Slotting survey report, "few operations can afford to ignore slotting because product location is the key to optimizing warehouse operations." Improving picking productivity reduces costs, particularly if your staff is paid hourly rather than salary.



ROI: If you're not updating your slotting strategy, your labor costs are higher than they should be.

MAXIMIZE SPACE UTILIZATION

Your warehouse space is valuable so optimizing product placement is essential. Efficient slotting helps ensure that no storage space is wasted. You'll also increase the opportunity to absorb new products or SKUs into your warehouse.

MINIMIZE PICKER TRAVEL

By optimizing SKU locations to make pick paths more efficient, you'll reduce the distance pickers have to walk every day. They'll pick faster and build pallets faster, providing you with improved fill rates and more on-time, accurate shipments.



ROI: Some companies have found that re-assigning slow moving products to bin shelving can significantly decrease pickers' travel times and free up warehouse space.

IMPROVED WORKER HEALTH AND SAFETY

Optimized slotting reduces visual search time and the movements pickers must make to retrieve items. Easier-to-reach placements improve worker safety as well as reduce ergonomic problems, which can in turn reduce worker compensation claims (and premiums).

INCREASE KEY PERFORMANCE INDICATORS

As your warehouse efficiency rises, you will be able to track related improvements in many of your key metrics (KPIs) such as picks per hour, cycle times, and inventory turns.

REDUCTION OF MULTIPLE OBJECT HANDLING

This one is self explanatory. Configure your warehouse to minimize the number of times an item, case, or pallet is touched and you'll save money.

REDUCTION IN STOCK DAMAGE

Fewer touches of items, and easier, more ergonomic access to them will reduce damage to SKUs and their packaging.

SLOTTING 101

If you want to implement slotting, you have a variety of options to figure out where to put your Stock Keeping Units (SKUs):

Fixed

This is the simplest, and, arguably, least efficient approach. Without analyzing potential operational improvement in areas such as workflow or labor usage, you simply assign SKUs to locations based on item size or physical characteristics. If you choose this method, cross your fingers and hope for the best.

Spreadsheet (Microsoft Excel)

You can also use a spreadsheet or database tool to help you manually assign SKU locations. You have to dig through a lot of data to arrive at your slotting decisions if you're going to be successful with this method.

Manual

Using your knowledge of how slotting decisions affect individual SKUs in the warehouse, you select locations based on physical characteristics or units of measure. The manual method differs from the fixed method in that the manual method allows you to control where to place those items and you have control of the type of slotting you want to use.

SLOTTING IN THE FIELD

How prevalent is slotting in a sector like retailing? A work in progress, if you believe a Supply Chain Consortium March 2007 survey of 100 top retail and related companies. Only 31% of respondents categorized their slotting plan as efficient or near optimal in terms of minimizing picking travel times. Slightly more than half (51%) reported using an internally developed spreadsheet, database tool or slotting software package to develop their slotting plans. Strangely, the majority reported that they do not use sales forecast data to support slotting plans.



ROI: At minimum, you can gain some impressive ROI numbers from simply basing your slotting implementation on weekly velocity.

TYPES OF SLOTTING STRATEGIES

Whatever method you use to implement slotting, generally speaking, you place slow moving items in manual picking areas, and faster turning items in automated areas.

Slot by velocity

You can slot items by velocity into locations based on fit and picking flow in your warehouse. For example, fastest moving items are stored closest to your pick/pack station.



Tip: Don't allocate 100% of your fast mover area. Keep some empty bins and shelf space available so that you can fill them up with unexpectedly popular items.

Slot by velocity w/bulk picking

You may be able to slot by aggregating smaller units into bulk picks.

Slot by fit

You can select a location that closely fits the item and sequence defined by its velocity will maximize cube utilization.

Balancing slot zones

You can choose to balance picking zones by distributing velocity across zones as evenly as possible. For example, put a few fast moving items in each row if you use zone picking and assign pickers to different rows. This way your picking work is more evenly distributed among your pickers.

PLANNING YOUR SLOTTING STRATEGY

There aren't any quick answers. The contents of your warehouse are not static so don't expect that your slotting activities can remain forever unchanged. Plan on continually tweaking your slotting strategy in response to unforeseen events or deviations from plan. Ideally, your slotting strategy would change in sync with your historical or forecasted product usage information, and things would remain fairly smooth. Unfortunately, though, the deviations from plan may be bigger than expected. Demand for one of your products might take off...or plummet far below your sales projections as demand for it never materializes. Beyond sales projections, you should also include criteria such as historical and forecast demand, seasonality, marketing and advertising programs in your slotting planning.



Note: You need to continually balance what you thought was going to happen against what is happening.

Make sure you identify slow moving items. Remove them from prime warehouse locations. Keep the better locations for faster moving items. Ideally, you would have downtime to decide which slower moving items you want to

move and move them before you hit your peak. If you're an online retailer, for example don't wait until Thanksgiving to reslot.



Note: Peak activity periods make it challenging to reslot. Do it before your seasonal rush. You should also plan how you are going to account for seasonal and promotional products for which you are moving lots of items within a short period of time.

An important consideration is how much effort will be required to maintain your new slotting plan. If you have a Warehouse Management System, will it support the slotting program you want to implement? How much does your product line change during the year? Do you typically carry over 70-80 percent of the items from year to year? Do you have the proper sizing of pick locations? You might even have to invest in new racking, shelving and wire decking.

MOVING FORWARD



Note: Don't let your company be one of the many that never adjusts its slotting strategy.

If you didn't know it already, improving slotting practices is a complicated process. There's a lot more to improving slotting than simply shortening the pick path. Hopefully, you've seen the benefits and understand that it's worth making the effort. You might be surprised to learn that some companies create new slotting plans every day. For them the ROI is worth it. Regular slotting analysis (even if it is much less frequent than daily) ensures that fast moving items in inventory will be regularly moved into the fast turnover area slots and that slow movers will be removed.



Tip: Solicit and listen to suggestions from warehouse pickers. You might also consider hiring or designating a slotting coordinator who can perform regular slotting evaluations.

Our Best Practice series is designed to set you on the path to inventory and warehouse management excellence. To supplement our chapters, you should continue reading as widely as possible on inventory and warehouse management subjects. An excellent slotting resource is *World Class Warehousing and Material Handling* by Dr. E. Frazelle, published September 18, 2001, ISBN-10: 0071376003 and ISBN-13: 978-0071376006.

If you don't have time to read Frazelle's book, here is how to get started on your own:

- **Find out the level of sophistication your warehouse management system will support**
- **Make a task list of everything you need to do to optimize your inventory**
- **Calculate the expected ROI for making each change**
- **Prioritize this list**
- **Start at the top with the task promising the greatest return. That's it**
- **Start tomorrow**

Chapter Eight: Putaway

The merchandise has arrived in your warehouse. Receiving is going well with cartons and pallets leaving the trailers and entering your facility. What are you going to do now? Let's discuss best practices for putaway and some of the processes you can implement to improve how you place received items in bins, cages or on shelves.

Putaway (as part of the material handling function) is the process that moves material from the receiving area to your storage, replenishment, or pick areas (or perhaps even straight into your manufacturing operation). Ideally, you're managing your putaway space requirements by calculating resource and space requirements based on your estimated or expected receipts, as well as current backlogs. What do you think you are going to receive today, tomorrow, next month or next season?

In a perfect world, product is put away the same day it's received. If you are unable to reach this daily objective, you're going to generate space and congestion problems. You'll increase the chances of creating transaction errors. Product will become more susceptible to damage—both from remaining on the ground, as well as being moved multiple times. Observe the inside of a warehouse and you'll often see picking staff just pushing the items they don't want aside in order to reach the items they do want.

If you run a busy operation, it can be tempting on those days when everything is going crazy to let putaway fall behind. You might decide to prioritize other tasks such as picking, replenishment, shipping, and loading. While items remain in the receipt or staging area, you might allocate labor resources to other duties. Do this—it can be very tempting some days—and you probably see fill rates drop as pickers are unable to find the product in the pick locations. Congestion develops as putaway slows. You'll run the risk of having merchandise overflow into the aisles.



Note: Supplying sufficient numbers of trained putaway staff will improve the efficiency of downstream processes such as picking and shipping. The ultimate end result should be better customer order fill rates.

THE NON-OPTIMIZED WAREHOUSE

Almost every warehouse has some level of difficulty optimizing inventory placement. Some of the reasons why you can fall short of perfection are failing to analyze inventory velocity history, insufficient space in the warehouse, or limitations on storage space vs. special product needs. Overall, however, the biggest source of inefficiency is the fact that inventory is not stored to minimize product picking transit time. You'll see this often in warehouses where the outbound operation is based on sales order or small package picking and shipping. In these situations, pickers fulfill one order at a time, regardless of the physical location of inventory in the warehouse. It adds up to a lot of unnecessary walking and searching.

BEST PRACTICES EXAMPLES

Generally speaking, you have three options for handling putaway:

Option one is to unload everything from the trailer and, after their receipt, place items on a purchase order list in the same location. As you receive items, match them against the packing list items. Once you can confirm the entire receipt, you can move items to storage or manufacturing. While probably the easiest way for you to receive and identify quantity errors, this method also requires a larger staging area. Items will sit on the ground longer, (see comments about damaged items above). You'll also keep pickers waiting if the items are needed immediately.

Option two is to group shipments by item. You won't have to wait until the entire purchase order has been received to move some of the product to its destination.

Option three is direct putaway, moving items directly from the trailer to its destination. This process uses the least space for staging and product is handled less and ready for use sooner. While the benefits are faster product speed and reduced capacity requirements in your staging areas, you might need to improve your warehousing operations because this method assumes that your warehousing operations is more sophisticated than the norm. Direct put-away programs require a more sophisticated warehouse management (WMS) system that has can assign locations from an advanced shipment notice (ASN) or upon receipt to the dock.

Whenever possible, best practice companies use cross-docking, the process of moving specific products to support an open order or replenishment request. The WMS system flags the product for cross-docking by matching it to an open order or replenishment requirement. This happens at the time of receipt, or after an ASN has arrived. Product may still end up in a special staging area but the WMS system keeps track of it and prioritizes it over other material. By reducing handling and delay, cross docking is a far more effective system to move priority product.



ROI: You will gain very quick ROI from grouping the fastest tuning items at the end of aisles. However, don't group all of these items together because you could invite problems during picking through congestion.

MATERIAL HANDLING TECHNOLOGY (DURING PUTAWAY AND PICKING)

As you've noticed during any warehouse tour, technology typically makes life easier and faster. What is common among companies known for their warehousing best practices is that they implement flexible and efficient material handling processes to meet current and future needs. They study their current operational needs, analyze trends to create forecasts of their future business needs and decide what they need for today and tomorrow.

From lift trucks and pallet jacks, to more complex (and more expensive options) such as radio frequency (RF) equipment in fork trucks and portable/hand held RF devices and completely automated systems comprised of customized conveyor systems, automated guided vehicle systems (AGVS) and automated storage systems, material handling is faster and much more efficient. As with most warehouse processes in which technology plays an increasing role, you can do basic blocking and tackling things as well as much more sophisticated implementations. The one-size-fits-all rule doesn't apply here. Everyone is different. Here are some of the options for next year's capital budget:

Warehouse Management System

You shouldn't find it surprising that best practice companies leverage their WMS to manage travel time from receiving to storage areas, pick locations and replenishment areas. I've already highlighted some of the specific ways. The application helps them map better putaway routes so that travel paths are sequenced based on the shortest product-to-load route. Along with reducing, aisle conflicts and congestion, many WMS programs also support task interleaving; most best-practice companies make use of this capability in their warehouses to reduce non-productive travel time. **Tip:** Use your WMS to implement bin location putaway and storage. You will be able to immediately and accurately locate product in your facility. Locating using bins will free you to locate product by sales volume so you can efficiency stock them close to their picking locations.

RF Technology

Best-practice companies typically use either a barcode or an RFID label to identify products, both of which work well. While barcode labels have been successfully used for many years and are more commonly seen today, you can principally thank Walmart for the warehouse industry's drive to implement RFID technology. One of its key

advantages is that RFID works better in harsh working conditions. RFID tags also hold a lot more information that can be adjusted as the item moves through a warehouse, and they can be read from almost any direction. RF terminals are a great way to reduce data entry errors. Installing the devices in lift trucks and supplying portable RF devices to employees will boost productivity. Assuming that your warehouse management system (WMS) works with RF-inputted data (if it doesn't, consider upgrading to a more expansive WMS system), you can provide accurate product relocation information to employees. Handheld devices which can receive material move notices will help you implement cross-docking.



Tip: Use product ID labels, zone or location labels and pallet license plates in your putaway process.

Automated Conveyor Systems

If you want to reduce travel time and material handling, and you have a lot of investment capital, you might want to investigate an automated conveyor system that uses sorters and diverters to divert and route product to the appropriate put-away zones. If your budget is sufficient and your warehouse layout large enough so that transit time from receiving to storage could be measurably reduced through automation, your primary benefits of implementing an auto conveyor system will be greater productivity and lower labor costs. If you receive a lot of case-size shipments, you'll also benefit.



Note: If you can afford them, automated conveyor systems that can sort and divert item according to zone and location will help you implement and optimize direct put-away.

Automated Storage/Retrieval Systems

Greater productivity and reduced labor costs are also delivered by installing an auto storage/retrieval system. In addition to these not inconsiderable benefits, you should also realize higher put-away accuracy. The caveat is that these installations are very expensive and generally suitable only for higher volume warehouse and distribution center. If yours is such an operation, this type of automation is worth investigating. Just don't be put by the price tag.

SAFETY ISSUES

OK, this sounds basic but all of the technology we've just reviewed can be dangerous in the absence of strong corporate policies and programs to ensure worker safety. Appropriately (and regularly) training your staff in warehouse safety when handling materials (during putaway or picking) delivers multiple benefits. Some of the more commonsense rules include prohibitions on forklift passengers (either hanging on the side, or riding forks) and riding pallet jacks (pump trucks) like skateboards. While the latter can be fun, it can also be dangerous and cause injuries. Avoiding injuries—to staff, product and facility equipment—is the major reason to implement and enforce company rules on unsafe behavior. You'll ultimately avoid OSHA investigations and save money through lower workmen's comp payments and lawsuit avoidance.

MOVING FORWARD

Putaway significantly affects overall warehouse efficiency. If you're considering upgrading your putaway processes and technology, here are a few questions to consider:

What do you need to do to move items and inventory from the receiving areas to the shelves?

What benefits does the technology promise or deliver? (Promise is this question as seen by the seller. The question, through the lens of the buyer, is based on what it actually delivers after implementation and fine-tuning. Only after installation will you be able to determine just how well it works. Hopefully, the delta between promised and real-world benefits will be small).

What is the TOC (total cost of ownership)? What is the upfront cost, as well as on-going training, maintenance, lifespan, etc? Get the big picture, rather than a portion.



Note: Putaway affects picking efficiency. In the optimized warehouse, efficient picking has its roots in efficient putaway. Consider velocity, product size and storage space or weight requirements when determining where to store items.

Understand (I'll repeat it) that almost every warehouse falls short of completely optimizing inventory placement. Challenges to "perfection" are due to myriad conditions, including insufficient storage space (you just don't have enough warehouse space) and the analytical challenges of forecasting based on historic inventory velocity history. What can you do about it? Tap your product sales history data to identify high-volume items. We're back again to the 80/20 (Pareto) Principle. Note those items accounting for 80 percent of your total demand. How are you going to pick them? By sales order? By zone? Put the highest moving products closest to your shipping areas, with the highest volume product closest. Your picking staff will save hundreds, if not, thousand of steps per day, just by doing this. You'll reduce labor costs and the time required to get orders out the door.



Tip: To maximize storage space, condense partial pallets. You'll be able to put more product away immediately after receiving it and keep the aisles clearer.

THE FINAL WORD

Unfortunately, many companies don't attribute the urgency to putaway that would otherwise produce increased efficiency. By neglecting putaway however, companies can well find themselves with lower fill rates, aisle congestion and picking obstructions. Fortunately, automation and an effective WMS can help you prioritize hot receipts—those that need to be immediately replenished or cross docked—and help you minimize and manage congestion.

Chapter Nine: Cycle Counting

Is inventory accuracy a possibility or an oxymoron?

If you can't find the numbers of parts, finished goods or product your inventory system says you have, you're undoubtedly wasting time looking for them, holding excess "just in case" inventory (and thus raising your inventory carrying costs), delaying customer orders, wasting time in production and order fulfillment, or generating unnecessary return processing costs.

The main reasons for the difference between what your Warehouse Management System (WMS) system thinks is in your warehouse and what you discover is actually on-hand are unrecorded or inaccurately recorded inventory transactions. A box of inventory placed on the wrong shelf. Forty pounds of steel fittings sent to manufacturing that were actually recorded as four pounds. A size 4 skirt whose packaging is incorrectly labeled as size 6 generates a return because the customer discovered it to be too small. When the product is returned into inventory, the receiver might just scan the bar code, updating the system with a phantom size 6 item. (This assumes, of course, that the packaging has not been destroyed, which in this case would be beneficial, because it would most likely lead to discovery of the incorrect labeling). The panacea for this is accurate real-time inventory data.

There are two ways to track inventory. You can either do a periodic physical inventory count, which is usually an annual event, or you can implement a cycle count program.

Counting Once

On the surface, physical counts provide a measure of reassurance to your financial auditors. However, one-time annual physical counts are expensive, and can shut down production or shipping functions for one or more days. There are some important downsides to physical counts, which include the temptation to cut corners. In many ways, a one-time annual count such as this often introduces new errors that may not be found for several months. This is particularly aggravated if you are counting on a day-off like a Saturday and no one wants to be there. There is also the time consuming task of planning the physical inventory. You've got to take many things into consideration –how many counting teams are required, how many man-hours it will take to get the job done, how much overtime you are willing to impose on your team on their day off, how many recounts are required, how much equipment is needed, whether you have enough gear or material, how much food you will need to buy – and if that isn't enough to keep you busy, have you planned out strategies for "no-shows" and do you have enough instructions for everyone to understand what to do?

Counting Many Times

In contrast, cycle counting, when properly implemented and managed, delivers more accurate inventory data. According to the American Production & Inventory Control Society Online Dictionary, cycle counting is:

"An inventory accuracy audit technique where inventory is counted on a cyclic schedule rather than once a year. A cycle inventory count is usually taken on a regular, defined basis (often more frequently for high-value or fast moving items and less frequently for low-value or slow moving items). Most effective cycle counting systems require the counting of a certain number of items every work day with each item counted at a prescribed frequency. The key purpose of cycle counting is to identify items in error, thus triggering research, identification, and elimination of the cause of the errors."

The elimination of errors is one of the benefits of auditing inventory accuracy and choosing to reconcile errors on a cyclical schedule rather than annual. Organizations that implement cycle counting increase the probability of highly accurate real-time merchandise inventory. Who are some of these organizations? In December, 2007, the Aberdeen Group surveyed 552 companies to determine which warehouse capabilities had the strongest correlation

to improved performance in the warehouse. According to their research, companies considered to be Best-in-Class were 49% more likely than their peers to practice cycle counting over physical inventories.

Another way of looking at cycle counting is confirmation of on-hand quantity. Accurate inventory data is one of the key foundations to better cooperation and collaboration between warehouse and client (internal clients such as production, for example, as well as external clients such as a retailer). Merchandise promotion, merchandising, and replenishment programs run more efficiently when the inventory numbers are accurate. There are improved order cycle times, reduced freight cost and returns are handled better.

Here are some of the benefits of cycle counting:

- **Reinforces the importance of accuracy in your organizational culture**
- **Generates focus on continuous improvement at the organizational level as well as within specific departments such as purchasing, warehousing, and manufacturing**
- **Greatly improves your ability to identify and fix inaccurate data, such as misplaced, mislabeled, or lost stock**
- **Improves your supply chain operations through more accurate inventory data**
- **Improves accuracy of data analysis, whether initiated by the manufacturer, vendor, owner, or the accounting department**
- **Reduces out of stock SKUs through real-time inventory accuracy**
- **Helps identify and correct receiving, shelving, ordering, packaging, labeling, returns, and fulfillment errors**
- **Improves inventory turns because you can measure what's in stock and moving out the door**
- **Improves customer service through higher fill rates**
- **Raises productivity and efficiency through more accurate data – leading to reduced operational and inventory-carry costs**

A Better Christmas for Everyone

Consider a Christmas shopping scenario when you might have visited a store to track down a gift. It was out-of-stock, but the clerk called the regional warehouse and ordered it for you. Is the item really in stock as the WMS shows? Will you be able to pick it up two days before Christmas?

Cycle counting needs to become part of your organizational DNA. Once you are up and running, you should be counting in a highly disciplined manner. You may end up counting three or four days per week. Sure, this may sound a lot but it beats the tedium of an annual count. Be aware, however, that if you only cycle count infrequently, you guarantee mediocre results. The only way to get the full benefit of any cycle count program is to count regularly, keep excellent and accurate records (particularly your data entry process to transfer the numbers into your WMS), and ruthlessly investigate errors.

HOW TO IMPLEMENT A CYCLE COUNTING PROGRAM

Here are some areas where you need to make decisions before you start.

Frequency

How often are you going to count? First, you need to calculate how many counts per year you can perform and work backwards, calculating the number of counts per day that you can do. You should consider the effects of cycle counting on customer service, production, shipping and receiving. One way to calculate your frequency is to time yourself. Count the number of items you are able to count in a single hour and you can quickly calculate how long it will take to count every item. While this is a rough estimate, it's a good starting point. Realistically, you should be counting your entire facility in cyclic quarters. As you progress through the first two quarters, you should be able to identify those items that need to be counted less frequently but no less than once or twice per year. If you cannot count your entire facility in one or two cyclic quarters, you may be understaffed.

Your Counting Strategy



Tip: Try not to over-complicate your strategy in the beginning. Pick three to five core methods and deviate only if you need to improve.

This should be fairly obvious: figure out how you're going to count well before you assign the counting. Are you going to count by location, item, expiration date, value, vendor, category, or another method? One popular way to keep cycle counting manageable is to rank your inventory, using the ABC method. This method uses classifications to determine count frequencies: you assign an "A," "B," or "C" classification to each of your items depending on how often that item enters or leaves your facility. Then, the most frequently used or shipped items are counted more often. For example, you might count class A items bimonthly. Class B items are counted monthly and class C items are counted twice a year. You might count slow moving items only once a year, this is class D. Inventory statistics generally show that the more often an item enters and leaves your inventory, the more often your data is incorrect. If the quantity is changing daily because it is a fast mover or popular item, it shouldn't be surprising that you are continually introducing opportunity for errors. Cycle counting by classification is a good method to catch errors quickly, where they are most likely to occur: with fast moving items.



Note: Cycle counting does not offer a "one size fits all" system. How, where and what you count are very dependent on your specific operation.

You might decide to count by a category or ABC classification. But you can also count by geography or physical location, which is arguably a version of annualized physical counting, albeit, reduced in scope so you can finish it in much less than one or two days. If you plan to count by location, divide your warehouse into physical areas, such as aisles, doors, sections, departments, shelves, or bins. Plan an orderly and consistent counting pattern that covers the entire area and ensures that all items are counted and entered into your WMS. Cycle counting by location is a good method to find misplaced or lost items hidden in corners or underneath shelving.



Tip: Until you are comfortable with the cycle counting process, it is recommended that you leave the quantities visible.

Are you going to provide counters with on-hand quantity visibility or are you going to conduct "blind counts"? In blind counts, your counters locate the appropriate item, count it and either write it down on a piece of paper or enter it in a real-time mobile device that sends the count directly to the WMS application. The opposite situation is where a counter knows the inventory and is essentially trying to confirm what is written down on paper or visible

on a screen. The temptation, or course, is to cheat and confirm whatever the number is. Particularly if it is late in that person's workday or the pizza lunch ended more than four hours earlier.



Tip: Perform cycle counts when no other transactional activity is taking place. For example, schedule your cycle counts during a down-time or when shipping and receiving is not taking place. Familiarize yourself with your warehouse management system (WMS) to ensure you know how to achieve your desired results.

Another important issue is timing your count. Scheduling your cycle counting depends entirely on your business and all of the other schedules that make your business unique. If you are counting items that are in the process of being received, moved or picked, you will need to make sure that your WMS keeps you informed of what is taking place or does automatic inbound/outbound validation for you. Make sure your written procedures include what the WMS handles or doesn't. If there is no validation, you will have to figure out a method of rationalizing inbound and outbound flow as well as the net. A WMS system is invaluable for this purpose. To do this, you need a comprehensive and global understanding of all of your organizational processes to figure out how to handle transactions.



ROI: Radio frequency enabled mobile devices can save time in recording cycle count information.

Whether you count with spreadsheet in hand or through an automated software application, you should consider the most efficient method for your operation, for instance, whether the chosen method will support your unique process, including setup time, strategy, and frequency of counts. Most efficient methods include the use of a radio frequency enabled (RF) mobile device. You key in data and through radio frequency signals the mobile device sends your data back to the database automatically, saving you time from manual key-punch. Real-time gives you, the person in charge of counting, "control" to update inventory in a real-time live mode. You benefit in many ways such as the elimination of double entries, reduced labor hours, just-in-time availability, collaboration and accuracy. Other mobile devices allow you to enter your data on the device and then batch upload your data when the device is placed in a cradle and hooked directly up to a computer. If this method is chosen you will need to consider the pitfalls of losing your data if the device fails, is mis-placed or if someone forgets to place the device in the cradle.

WHO IS IN CHARGE (AND OTHER PERSONNEL ISSUES)

Who is going to take responsibility for ensuring that your cycle count program actually works as planned? You need to identify someone, and give him/her responsibility and—more importantly—accountability for the accuracy of the inventory. You also might want to make this same person responsible for training staff on counting procedures and the value of inventory accuracy.



Tip: Include cycle counting and the importance of inventory accuracy in orientation programs for new employees.

Whoever is responsible for cycle counting needs to understand and accurately estimate the likely counting performance against the time available for counting. Ensure that sufficient staff are available and appropriately trained so that you can complete the count as planned. This means having necessary supplies on-hand. If you're using bar code or RFID scanners, make sure the battery is charged and users are trained on how to operate the device and navigate through the WMS application..

A TOE IN THE WATER

Start small. In fact, start really small. Gently introduce your organization and employees to the brave new world of cycle counting.



Note: Start with limited cycle counting and work the kinks out in your processes before you spread it across the organization

Here is a sample program to get you started with cycle counting:

- **Select 200 items/parts/products/finished goods from your inventory**
- **Divide them into counts of 50/day, that you will do Tuesday through Friday**
- **Accurately count and record all items**
- **Investigate variances each day**
- **Keep track of daily accuracy/variance percentages**
- **Investigate causes and origins of errors**
- **Localize cause and correct inventory record**
- **Determine cause and delegate responsibility for fixing it**
- **Select another 200 parts/products/finished goods from your inventory for week two**
- **Keep checking until accuracy exceeds 97% for minimum of two weeks**



Tip: Select slow moving items/parts/products/finished goods for your first cycle counting tests. You won't have to deal with or account for transactional movement of stock (either in or out of inventory), which will be a future issue when you start counting more frequently moved items.

Once you have completed this two-week baptism, review the process and results. What worked well? What didn't work? What surprises/unexpected information did you gather? After a few tests, adjust your cycle counts in manageable chunks that allow you to completely inventory your entire facility in three months. This will reduce the error rate if/when you perform an annual inventory.

If the upside, that is, the lure of more accurate inventory data, is too appealing to ignore, consider gradually expanding your cycle counting program in your organization. There is always room to improve on a cycle count. You can set up different cycles, add more items or locations, group items together, separate complex items/locations. As you progress, find the methods that aide you in doubling or tripling your items or locations during a count. This will enable performance efficiencies during this process, and let's face it, it's nice to be the hero every now and then.

You should now be ready to expand cycle counting into the darkest reaches of your organization. Once you have reviewed your cycle counting system, and optimized procedures for investigating and resolving errors, you can expand your counting program to include all inventory items.

GARBAGE IN...HOW TO REDUCE ERRORS

Errors are part of the cycle counting life. Mistakes are a good thing, though, if you learn from them. Think initially in terms of discovering errors, then reducing them, and then ultimately eliminating them. Not only are you going to uncover multiple errors in inventory count, you're probably going to experience errors in the counting. One of the great benefits of cycle counting is continuous improvement. Various warehouse industry experts point to an error reduction circle, in which continuous improvement is the goal. Here is how this cycle looks:

- **Find the error**
- **Research it**
- **Identify its cause (misplaced items, misshipped items, incorrectly entered orders, etc.)**
- **Address and eliminate the cause (take corrective action based on what you learn)**
- **Continue cycle counting and implementing process improvements to raise inventory accuracy**
- **Repeat**
- **Repeat again**

Consistency is king. Spend the time to unearth errors and eradicate them from your operations. As long as your inventory accuracy is improving, pat yourself on the back.



Note: Focus on your consistency rather than industry benchmarks. (You probably have no idea what metrics this industry benchmarker is using anyway).

THE POWER TO MOVE THE YARDSTICKS: WHO GETS TO?

You're also going to need to implement a process to approve and adjust inventory levels for "lost", "found", or damaged items. The person responsible for doing this must understand the effects of adjusting inventory to account for "lost" and "found" items. A "lost" product noted in a Monday count might have generated a purchase order two days later because the forthcoming forecast requires it. What happens, then, if the product is located on Thursday? How do you reconcile all of these micro and macro effects on your inventory? In this case the carrying cost will go up because more product is purchased. You now have less space for other items. You've added an additional item to receive increasing inbound labor. And in some cases the "Buyer" may appear to be at fault for ordering too much product. On the other side of coin if you over-count during a cycle count, or in essence over-state your inventory, the reverse applies and has a much worse affect because the product cannot be found. Your fill rate suffers, your customers might be agitated, you struggle to look for "missing" inventory that never existed in the first place and the buyer doubles the order to make up for lost sales and now has the same affect as if the product were lost.



Note: Cycle count accuracy is an equally important criteria just as receiving, production, picking, and shipping. Assign responsibility appropriately.

If your cycle counting program is successful, there is little benefit to conducting an annual physical inventory. Some of the people in your organization might be reluctant to forego the annual physical count. If you can prove

the accuracy of your inventory (that has been developed using cycle counting), you should be able to persuasively argue against the annual count. You'll save on pizza money and employees will be really happy you didn't ask them come in on a snowy Saturday in January.

Chapter Ten: Replenishment

While you'd like to run a lean operation, how can you do it if customers demand that inventory is available to fulfill their orders on the requested date? This chapter discusses some of the ways you can manage your inventory better and make customers happier. We're going to look at best practices for warehouse replenishment.

What is replenishment? It is the process of moving or re-supplying inventory from a reserve storage location to either a primary picking location, or to another storage area in which picking is performed. Something that every warehouse or 3PL must do, replenishment is a vital part of warehouse management because it ensures that the picking area contains sufficient stock to satisfy expected demand.

Short-term changes in demand are a constant. Inventory costs you money. Balancing existing inventory holding costs and the costs of procuring and/or manufacturing additional inventory will help you determine optimal replenishment quantities. Calculating these quantities is usually done with some kind of warehouse management system or distribution requirements planning system. Ideally, the system is automated where replenishment activities are created with minor interaction between the system and personnel. The result is a formal process of replenishing warehouse stock that should lead to fewer disruptions, smoother picking, and lower overall costs. By understanding basic inventory policies, and their interdependencies, you can create an inventory replenishment plan that meets customer service levels while enabling you to maintain lower inventory levels and a decrease in labor activity.

What can replenishment look like? Moving product from a bulk storage area optimized for pallets, for example, to a small pick area where flow racks and pick-to-light technology enables unit picks. In smaller operations, products are simply moved from receiving to the primary storage location. In larger operations, products may be stored in more than one location. Ensuring that there is enough product in the pick location so that pick lists can be completed is replenishment's goal.

A primary inventory management goal within your company should be to optimize the stock replenishment process and the goods handling pipeline. As you control and improve replenishment, material flow and logistics, the accuracy of your stock usage and forecast planning will rise. The net effect is that sufficient product will be available at the pick face when it is time to fill an order.



Note: By improving replenishment, you can increase the accuracy of your stock usage and forecast planning

SOME THINGS TO THINK ABOUT

Here are some of the things you should think about when creating a pick face replenishment policy.

Should you have a pick face?

Is there a business case for it? This depends on your business situation. Are you a distributor that sources or manufactures bulk goods and then fulfills orders in much smaller quantities? This means that you are probably receiving pallets in and shipping out cases or cartons. If so, a pick area can really boost productivity and order velocity.

What are you going to stock in the pick face?

This depends on the types of locations you are using and your particular type of slotting method, see [Inventory and Warehouse Management Best Practices: Slotting for Dollars]. Whether or not you think you have locations iden-

tified as a pick face location, you do. Your product is sitting somewhere on a dock, in a rack, in a container, on the floor, or in your office. This means you have identified a location to pick from and a location to store excess stock. Determining whether or not these locations are prime locations for fast movers is critical when deciding what goes in a pick face or floating location (both are pick locations). If you have the space, every unique item should have a pick face; otherwise only fast movers should be available in the pick face. How do you define fast? This is somewhat subjective. To identify the fast threshold, analyze the pick area demand. Don't look at data such as average pick quantity; instead look at the pick face volume. That's your focus.

Where are you slotting items?

The first consideration with slotting is determining whether the pick locations should be fixed or floating. If items are picked frequently, they should be stored in a position that facilitates efficient picking. Use dedicated locations for items with steady demand. If items are picked infrequently, either due to unstable or seasonal demand, store them in floating locations that can change according to your picking needs. Slot them in high availability locations during busy periods, relocating them when demand decreases.



Note: Understand that there is a tradeoff between pick slot design and replenishment frequency.

What quantity should the pick face hold?

The pick face should hold enough stock to minimize trips from reserve stock. Factors affecting the quantity include the container capacity (the cubic volume of the bin, for example), the weight of an item (to allow hand stacking replenishment without causing injury), as well as the individual item's size (small items placed in shelves, large items placed in bulk areas). Another fact, of course, is the number of picks. The pick face should hold enough inventory to satisfy 5-10 picks before replenishment is required.

How do you determine the replenishment lot size?

You determine the size of the replenishment lot. Is it by case or some other quantity? It is up to you. If you replenish using a standard pack (six items for example), use the same amount as the replenishment lot size. In the best scenario, product stored in the reserve location is replenished by using the entire lot (e.g. twenty cases on a pallet) in a reserve location. This enables you to you can replenish the pick face in a single trip.

How will you know when to replenish? What is the trigger?

This is the threshold at which your replenishment system initiates a replenishment sequence. What is the minimum quantity that the pick face stock needs to drop to in order to kick off the process of filling it up again? There are several factors to consider. Depending on the speed with which you can replenish the pick face, you can usually wait until the quantity decreases to a small number, usually between 1-5 units, before replenishment is needed. Setting this number too high can create replenishment issues such as pick faces with either too much product or unable to hold the extra stock, resulting in it lying on the floor nearby and susceptible to damage. A replenishment trigger that is too small means that several replenishment trips may have to take place, increasing labor costs, the risk of incomplete shipments and poor fill rates.



Tip: Determine the best unit quantity to trigger a replenishment. This will increase productivity and fill rates while reducing labor costs.

REPLENISHMENT OPTIONS

There are a couple of different stock replenishment options you can consider:

Real time

This type is triggered depending on the pick lists. You use it if the required stock to fulfill an order is either unavailable or requires breakdown of some kind. The goal of this method is to ensure the pick location has enough inventory to be fulfilled by the time the picker reaches that location/item. It uses the warehouse management systems automatic replenishment process when pick tickets are generated. It also reduces manual processes of knowing exactly when to perform a replenishment. The downside of this method is that should your system inventory is incorrect, you won't know it until the replenishment is performed. This may cause a return trip to a reserve location.

Non-Real time

This method helps you avoid having pickers and replenishment staff running into each other. The replenishment process takes place independent of picking waves, at different times and places. One option is to schedule picking and replenishment at completely different times. The upside to this method is that every location is physically checked for stock and replenishments can be performed before pick lists are generated. The downside is that without system automation, multiple trips to retrieve reserve stock to fill the pick location and return the reserve stock increases labor while decreasing productivity. It also does not account for pending shipments that exceed the pick face's current capacity.



Tip: Schedule picking and replenishment at different times or in alternating aisles, so pickers and replenishment operators won't interfere with each other's work.

YOUR PLANNING WORKSHEET?

Here is a suggested workflow sequence to improve replenishment in your operation.

Understanding Demand

You need to track sales demand from your customers, paying close attention to short- and long-term patterns. A spike in demand doesn't mean you need to reslot your items to accommodate replenishment cycles.

Regular Inventory Turns/Promotional-driven Demand/Variability

Make sure that you don't confuse regular inventory throughput with sales waves that peak due to seasonality or special promotions. Promotions juice sales but can be illusory (as well as ephemeral). While sales variability is normal, trends should appear in your data analysis.

Safety Stock

Safety stock, or additional inventory units carried as protection against possible stockouts, help you weather the unexpected. You need to be able to replenish even when unexpected sales orders arrive. Too much buffer stock increases inventory holding costs as well as increases the chances that those items will either spoil, expire, or be damaged when the product is moved to a dead stock location. Who covers the cost if you order too much product? The opposite risk is that insufficient safety stock will reduce revenue, cause poor fill rates and possibly lead to higher customer turnover. The enduring challenge, therefore, is to find the right balance. If you know the standard deviation of your average demand, you can determine safety stock levels.

Lead Time

It is also important to understand replenishment time. You need to account for the time it takes to identify items to reorder, submit an order to the supplier/manufacturer, and the delivery to your warehouse. Lead time is the delay between the reorder point (when the inventory decreases to the predetermined point which triggers a new order) and the time when the item arrives and is received.



Tip: It is really critical to know how long it takes for product to arrive in your facility after placing an order. What is the standard deviation of these lead times? If you don't know because you haven't been tracking this data, it is time to start.



Note: If you are experiencing unexpected stock-outs, think about implementing a computerized inventory tracking system, in addition to creating a process to regularly review the faster moving items.

Stocking Time

How long does it take once you receive inventory in your warehouse to move it to the pick face? Excluding cross-dock operations, product received but not put away is the same as not having the product at all. If you're fortunate enough to be able to pick product from the dock or receiving area then fulfillment rates can still be achieved. This does, however, introduce new conditions that can affect inventory (damages, theft, lost product, misshipped product).

A REPLENISHMENT AUDIT OF YOUR OPERATION

To plan your own replenishment program, here are some steps to get you started. For a thorough review, you'll need access to pick data, including historical throughout and specific information such as the volume of items stored at the pick face.

Start by looking at your pick data history. Track your previous replenishment activity. If you are replenishing a specific item more than once a week, consider increasing the item's storage capacity in your primary pick area or move the item to a more appropriate location. The next step is to create a classification system. Classify items into A, B, and C categories. "A" items are the fastest-movers, comprising the top 5%. These will require the most frequent replenishment. Those which comprise the next 15% are put into the "B" category, and require bi-monthly replenishment. The slowest movers, the "C" items, should only require replenishment once every few weeks or months.



Tip: By scheduling replenishment time closer to customer lead time, you can identify steps that eat up time between warehouse and store, as well as eliminate variability at the shelf and with your customers.

As you look at your replenishment, you also need to consider how items will move to, and within the pick face. Optimizing material flow will help you store more and ease replenishment. Part of the optimization process is to locate overflow items near their primary storage location, preferably above or adjacent to this spot. Flow systems will also help you handle FIFO (first in, first out) inventory.

Here are two material handling recommendations:

- **Consider installing flow rack or pallet flow for your faster-moving items.**

- **Consider replacing ladders with powered lift equipment. Powered trucks and equipment can make your operation safer, as well as reduce labor costs.**

How a new replenishment system might look in your operation

You'll need to create or establish some kind of signaling process to trigger replenishment. When inventory in your pick locations drops to a preset minimum, the warehouse management system (WMS) should notify personnel to replenish the bins. The next step is to move products from the floor reserves or relocate product from reserve locations closer to the pick bins (try to have the same item as close as possible to the pick location). Then inventory needs to be ordered to ensure your safety stock levels are filled.



Tip: When planning replenishment, locate replenishment stock close to pick locations. For slow moving products, pull batch quantities. Try and create replenishment pick routes that enable workers to batch pick replenishment stock for a zone of pick modules.

CONCLUSION

Focus on replenishment processes that support your current picking system strategy and technology or an updated version you plan to shortly implement. Some companies have implemented picking systems that promised large efficiency increases, only to find that their hopes for a large ROI were bedeviled by problems in replenishing pick locations. To avoid this example of the law of unintended consequences, spend the necessary time and effort to test and model replenishment processes and capacities before moving forward with your changes. Don't invest everything in revamping picking processes without spending sufficient (not necessarily equal but sufficient) time in optimizing replenishment plans.



Tip: If you are distributing to retail stores, access to point-of-sale data directly from the retailer's stores will help you implement a demand-driven replenishment system. If you have real-time visibility into the store sales, you can respond instantly to changes in consumer demand.

Chapter Eleven: Picking: Selecting the Right Systems, Methods and Technologies

In our previous chapter on Best Practices for Picking, we revealed the secret to great picking efficiency—the imperative to minimize walk time and product handling by your picking staff. Each unnecessary footstep taken by a picker reduces optimal efficiency, as do multiple touches of items. The simplest and easiest way to avoid these situations is to locate product by pick frequency.

OK, while this shouldn't be hard to understand, what picking system and which technologies increase the chances of picking efficiently?

There are three main picking systems, piece picking, case load picking and pallet picking. Some warehouses will be able to use just one, while others will find their greatest efficiency and performance levels by using two or more in combination. Next, we'll discuss which picking methods work best for each picking system. Finally, we'll look at a wide variety of technology and equipment choices, weighing their pros and cons for each picking system and method.

PICKING SYSTEMS

Piece Picking

In piece picking, you pick individual items and put them into shipping containers (usually cartons or boxes). You often find this method in warehouses housing lots and lots of SKUs. When you have large quantities of items to pick (think in terms of thousands or tens of thousands of SKUs), piece picking is typically what you will use. Your classic mail order house or parts distributor stores their inventory in fixed locations on static shelving or racks. Pickers fill one order at a time. It is a basic system that works well in warehouses that fulfill a smaller number of orders per day. As volume grows, however, the system can begin to fall apart due to excessive picker travel time and aisle congestion.



ROI Opportunity: Accurate inventory-by-location data is a prerequisite to efficient, successful picking so make sure your staff continually updates your Warehouse Management System (WMS).

Case Picking

Case picking works for operations that aren't filling orders with open box picks. A warehouse using case picking usually has fewer product SKUs from which it fills its orders as well as higher picks per SKU. You'll see a lot of pallet jacks or pump trucks in these operations as well as motorized pallet trucks to retrieve cases stored in racks.

Pallet Picking

If you're shipping pallets out, then you're using some form of pallet picking. You've also got a lot of choices as far as storage configurations and equipment and the lift trucks/towmotors your pickers will use to retrieve pallet loads.

PICKING METHODS

There are five common picking methods: basic picking, batch picking, multi-order picking, zone picking and wave picking.

Basic (Fixed Location) Picking

This is the most common picking method, regardless of whether you are piece case or pallet picking. Inventory remains in a fixed location, with orders filled one at a time. In piece picking, product rests in bins or sits on static shelving or pallet racks. In case-pick and pallet pick warehouses, product is stored in pallet racks or sits on the floor. The piece picker, usually pushing a cart up and down aisles, fills one order at a time. As mentioned previously, you should have the fastest moving SKUs positioned as close as possible to the start of the pick routes. The picking document should be synchronized with the pick location of the items listed on it. (Refer to your WMS user manual on how to do this). Case and pallet picking are similar, although done with equipment such as a hand, motorized pallet jack, or a lift truck.

Batch Picking

When batch picking, you combine individual order picks into small groups. You use a consolidated pick list and place items for different orders into separate totes or different shelves on a picking cart. You need a lot of SKU accuracy in your WMS to effectively consolidate orders. If your orders usually call for a few picks each, batch picking can help reduce those unnecessary extra footsteps. One of batch picking's chief drawbacks, though, is that you have to wait for orders to pile up so you can aggregate them into one path for the picker. Delivery promises to customers may make this delay unacceptably long. Batch picking generally doesn't work for case picking due to the physical dimensions of cases and it has no application in pallet picking because you're usually picking a single pallet per trip.



Note: If you're going to do batch picking, you need some Quality Assurance (verification) procedures to prevent order mixing.

Zone Picking

If your operation has lots of SKUs, lots of orders per day, but a relatively low pick-to-order ratio, zone picking could work. Think of it as an assembly line, where the entire picking team is contributing to the success of each individual order. Individual team members are responsible for an area or zone and only pick items located within it. Items are usually moved along from zone to zone on a conveyor. Zone picking works well for piece picking but the physical dimensions of cases, again, restrict its use in case picking. Zone picking doesn't really apply in pallet picking operations, other than delivering individual pallets to staging areas close to the shipping docks.



Note: The lowest common denominator rule applies here. You're only as fast as your slowest picker, with zone picking throughput limited by whomever is slowest or by the capacity of your busiest pick zone.

Wave Picking

If your operation has lots of SKUs as well as higher than average pick-to-order ratios, wave picking (a combination of zone and batch picking) might work well for you. Rather than taking a sequential approach to picking, all zones complete their picks simultaneously. After the pickers are finished retrieving the items, they are sorted into individual orders.

PICKING EQUIPMENT AND TECHNOLOGY OPTIONS: YOUR SHOPPING LIST

By selecting appropriate equipment and technologies that fit and complement your operational profile, you can

improve the operational metrics (accuracy, productivity and cycle time) that we discussed in the previous Best Practices chapter. You'll also accrue other benefits, such as reducing product damage, and improving space utilization.



Tip: Technology isn't a panacea but it can help you address employment issues, such as rising labor cost, and the decreasing availability of workers, that could seriously affect your operation in the future.

Here are some of the options you have to increase automation use in your facility:

Automatic picking machines

The use of fully automated picking machines is generally restricted to operations combining high volume with high accuracy requirements.

Automatic storage and retrieval systems

An expensive, high-volume retrieval system of rows of racking used in both putaway and picking. Storage density can be very high but they are expensive to install and can limit your operational flexibility as market conditions change. Probably better suited to case and pallet picking operations than piece picking.

Automated conveyor and sortation systems

Automated conveyor systems and sortation systems are commonly found in high-volume piece pick operations as well as some variations (zone picking, for example) of case pick and pallet pick operations.

Bar code scanners

About as proven a technology as you can find in the modern warehouse, bar code scanning increases accuracy and works best when time-to-pick is longer. If your operation requires high-volume piece picking, scanning bar codes can slow productivity. In contrast, it is very useful when picking by the caseload or pallet.

Carton flow rack

Similar to static shelving, except that the shelves are angled downwards, enabling gravity feed of totes, bins or totes to the pick face. Flow racks are very useful for helping pickers fill many orders from the same SKU. Depending on the size of the racks, they can be used in both case pick and pallet pick operations.

Carousels

Well-suited to piece picking, you've probably noticed horizontal carousels in your local dry cleaners, as you waited for shirts or blouses to appear from around the corner. A series of hanging racks that hold storage bins of various sizes, these systems help warehouses fill high volumes of orders. While you can also find vertically oriented carousels in laboratories and specialty manufacturing operations, they are rarely used in regular order picking operations.

Lift trucks

Lift trucks (in all of their versions) are a common sight in case pick operations. Their use in pallet pick operations depends upon how and where pallets are stored. Depending on your storage design, you may have to use standard lift trucks, reach trucks, swing mast or turret trucks.

Pallet racking

Pallet racking is a prerequisite for any case pick or pallet pick operation. Which type you choose (from the standard back-to-back single pallet design to drive-thru racking) depends on many issues. How many pallets per SKU and per pick do you expect to have? How dense is your warehouse layout? How many orders will you be filling daily? How much racking can you afford to install?

Paper

Not exactly a technology, unless you consider how leading edge it was when first invented in China during the early 2nd century, if you use paper in your facility, remember a few simple rules. Design your forms so they are easy to read. Make sure the printing is legible by keeping a sufficient inventory of printing supplies on-site so that pickers can read what they are supposed to pick. Failing to do this increases the chances of inaccurate picking.

Pick-to-light

Often integrated into carousels, pick-to-light systems consist of lights and LED displays for each pick location, using software to light the next pick task and display the quantity to pick. You will usually see very high accuracy rates, as the light displays can be integrated into cartons and totes into which picked items are placed. These systems are good for high pick-per-SKU shipments. Because the lights can be easily moved, they also adapt well in warehouses in which SKU location changes due to merchandise seasonality.

Radio frequency (RFID)

Thanks to Wal-Mart, RFID applications in distribution are getting a lot of media coverage. Some interesting case pick applications involve combining voice recognition to direct the picker, followed by RFID sensors that identify cartons as they are placed on a pallet, and then confirm picking accuracy (the correct cases and quantities).

Static shelving

Most commonly found in piece pick operations, this is best suited for low-volume small parts operations. If you're just starting out, look around and you can probably find lots of used equipments.

Voice and speech recognition

Many industry experts anoint this as the biggest technological innovation since the 1970s. To clarify, voice recognition is capturing the voice to identify the speaker. Speech recognition captures the voice for the purpose of identifying and confirming what the speaker has said. You don't have to search very hard in the supply chain industry trade media to find case studies of companies that have reaped great returns from voice or speech recognition technology using systems from vendors such as VoCollect, Lucasware, CTG, and Voxware. While increasingly popular for inventory and receiving, it has tremendous picking applications, regardless of whether you are picking by the piece, case, or pallet. Voice directed picking can have a huge impact on increasing productivity and accuracy. One of the main catalysts to the dramatic growth in voice technology adoption in recent years is that WMS vendors have increasingly supported voice integration. Voice has now become a standard feature with most WMS offerings.



Note: When pickers have to recite long sequences of alphanumeric characters (think serial numbers and UPC codes), speech recognition is less reliable than RFID and barcode scanning.

Warehouse Management Systems (WMS)

As mentioned earlier, Warehouse Management Systems are a huge productivity booster for picking. Properly used, they are the glue that helps you organize all of your data so that picking is fast and accurate and efficient.



Note: It is garbage in/garbage out so keep your WMS filled with real-time and accurate inventory data. Properly program your system so that pick sheets or lists have the items in the same order the picker will find them in the warehouse.

SOME GENERAL RULES FOR EQUIPMENT SELECTION

There is an inverse relationship between automation and operational flexibility. Little automation maximizes flexibility. If you are fortunate to operate in a low wage area where labor costs are still manageable, you may not even have to justify automation projects. The more you are married to physical equipment, the less nimble you can be in growing your business.

To rigid finance people, this might be enough to kill new technology acquisition projects. They might also balk at the fact that ROI calculations used to justify the expense of new equipment must be based on future projections. It is a leap of faith for everyone and, sometimes, finance people have trouble pushing off the ground. Their perspective also changes depending on whether they have the luxury of working for a private company whose payback timelines are usually much longer than the quarterly “earnings-per-share” slavery of publicly traded companies. A listed company simply doesn’t have the same patience for large capital projects to pay off.

Chapter Twelve: Kitting and Sub-Assembly

INTRODUCTION

Let's talk about Best Practices for kitting and assembly. They mean different things depending on your position within the supply chain. Many companies use kitting and assembly interchangeably together but they are indeed different.

Manufacturers typically use the term assembly while wholesaling industry (comprised of 3PL and distribution companies) use kitting. You are either combining raw materials to create a finished good, or combining already finished goods into a larger group. Even if you have raw goods, you can still kit for assembly. Kitting is for anyone who wants to combine group items together, build a product, or make a master item.

If you are a distributor looking to build business with just-in-time manufacturers, kitting is a value-added service to offer to prospects during your sales/business development conversations. If you are a 3PL, you may have manufacturing customers that, due to a lack of storage space for example, may want to send you raw goods for kitting.

KITTING DEFINED: IT DEPENDS ON YOUR PERSPECTIVE

Kitting applications are wide and varied. Dell uses the process to assemble the millions of desktop and laptop computers that it annually sells. In this case, it is assembling finished goods into a larger whole. In contrast, a more classic manufacturer will deliver predetermined quantities of components and subassemblies to the factory floor where they are placed together in specific containers. There are also multiple other versions:

- **Light assembly of components or parts into defined units**
- **The physical task of collecting and assembling materials that serve as components of an assembled presentation, product or package**
- **Placing two or more items into a grouped item sold as a single item from the inventory file**
- **A cost-effective way of procuring all components required to make an assembly**
- **Products packed and labeled individually for each specific customer assembly**
- **Assembly of product or parts within the warehouse**
- **Kitting can be very beneficial when the assemblies have a high degree of variation. Think of the concept of mass customization. In contrast, kitting is less useful if the assemblies are highly standardized. In these scenarios, you might just end up with extra and unnecessary part handling. Adieu to your objective of lean production. More on this below.**

KITTING BENEFITS

As you can see, kitting comes in many flavors. But what is the overall purpose? While it helps companies keep inventory levels as low as possible, ensure that materials and products are available for production and customer delivery, as well as plan manufacturing activities, delivery schedules and purchasing activities, kitting can deliver even more benefits:

Facilities

By reducing stock and using, kitting can save space that is normally allocated to manufacturing or inventory.

Operations

Kitting can positively impact the efficiency of your operations. By eliminating the need to supply individual component containers, you can reduce material delivery to workstations. Similar efficiency is available if you are a manufacturer or distributor that uses machinery to assemble. You don't have to stop the lines due to part shortages or need to search for parts. Another benefit is that your shop floor can be cleaner because you're using fewer containers with more individual items in each, rather than a container for every component.

Competitiveness

Two areas where kitting clearly adds economic value is by 1. increasing throughput in pick and pack and manufacturing operations, and 2. reducing Work in Progress (WIP) inventory. (WIP bottlenecks at or near the production lines can be reduced, or at least better controlled). By storing primary components and subassemblies in a centralized storage area, kitting can reduce WIP inventory at the point of assembly.

Flexibility

Since components are not stored or staged at the points of assembly, facilities have greater flexibility in changing assembly lines as well as the products they assemble.

Employees

When kitting is part of the process, assembly workers usually spend more time assembling and less time walking around searching for components. The value-add time contributed by assemblers is therefore maximized. Another benefit that researchers who have academically studied kitting operations have noticed is that new staff training costs and acclimation periods are reduced.

Quality

Kitting can have a very positive upside when tracking product and part quality. Part damage, due to less handling will usually drop. This is especially important if the parts are either expensive or perishable. Another area where quality improves is tracing and correcting defects. Kitting provides the opportunity to have quality control verification earlier, reducing the possibility of wrong parts or incorrectly assembled components being used in the final product.

A CAVEAT: THE DARK SIDE OF KITTING

Before we move on, let's look at the dark side of kitting. Like the other best practices for warehouse and inventory management that we've already discussed, you'll love the benefits if it is done well. Product quality will plummet if it is poorly implemented and issues such as making kits with missing or incorrect parts results.

WHEN KITTING GOES SIDEWAYS

We've looked at the benefits. Now, let's look at some of the negative issues that can arise if your kitting isn't working quite as well as planned.

An insufficient quantity of components, having too many of the right ones (or wrong ones), or even either damaged or poor quality components can create some obvious problems as well as some that aren't as evident.

Defective parts that are inadvertently used in certain kits will lead to parts shortages at the workstations. Kits found to contain defective parts during quality control will have to be reassembled. A temporary shortage of parts

may be addressed by building the kit anyway. This will reduce overall efficiency because you'll have to handle the kits a second time after receiving the missing pieces. (You'll also need to create storage space for these partially assembled kits). Part shortages can also result from cannibalization where parts are removed from raw inventory or completed kits. All of these actions, usually taken by well-meaning workers will exacerbate part shortages, screwing up inventory accuracy.

Another issue to consider is having a sufficient quantity of replacement parts for the kitting process. Your kitting work may require parts that fail or break during assembly. They may be fragile or your workers may be sloppy or the assembly process itself may be difficult. Factor in the possibility of having either a spare piece with each kit or to having extras stored in containers at some workstations close to the kitting activity.

Finally, you'll have to account for additional storage space to handle kits that are prepared in advance. Balance the cost of this physical space against all of the benefits just described.



Note: inefficient kitting can waste employee time, idle machinery, necessitate additional and otherwise unnecessary inventory capacity requirements and create quality control problems.

CONSIDERATIONS BEFORE IMPLEMENTING YOUR OWN KITTING PROCESS

OK, you're considering kitting and want to know a little more about planning. Take the time to think before you jump. Here are some things to consider:

How

Kit assembly is basically a version of order picking. Your challenges are:

- **Designing the kits for ease of creation**
- **Designing the kits for ease of assembly (how are people going to remove the components from them)**
- **Figuring out how to put the correct parts into the correct kit**
- **Determining how you are going to deliver the correct kit to the correct workstation**

Since a kit usually comprises several components or sub assemblies, you usually assemble more than one at a time. After component and subassemblies are brought to the kitting area, it is more efficient to assemble several kits of the same type. Some people call this batch kitting.



Tip: Consider having additional small parts on hand. Some companies specify a percentage overage, which is known as over-kitting, while others simply keep spares in stock. You might have to make a friend in purchasing, document control, or manufacturing to buy the extras.

A Few Words on Optimizing Your Picking Process

While picking is such an important subject that it merits its own best practice chapter, we'll briefly mention the relationship between kitting and picking. The types of kits you make will influence the picking process that is best for your operation. Picking and kitting are closely tied together. If you want to introduce kitting into your operation, you'll have to select and implement an appropriate picking method.



Note: Optimize your picking process for the type of kits that you are going to build

Batch and zone picking (and their variations) can each work but their effectiveness depends on the unique characteristics of the kits you need to make. Some kitting experts believe that batch picking (and kitting) only works if the parts comprising kits are similar. However, batch kitting can work if you are building multiple kits which contain the same parts variations. While it is true that batch picking can produce higher picking efficiency, these gains can be offset by the time spent sorting and administering parts.

Another option is zone picking. There are two common methods. The first is to process each order or kit one zone at a time, in effect you are kitting as you pick (pick methods are explained here). With this method you pick the parts and kit at the same time until it reaches its final zone where the kit is completed. The other common method is to have all of the kit orders picked simultaneously. Parts from each order are picked from each zone and are dropped off at a staging area where the parts are prepared for final assembly or kitted.



ROI Opportunity: Depending on the picking process you select, you may or may not have to make a sizable capital investment in new technology (pick-to-light for example) and information technology products and services.



Tip: When designing a kitting process, pay attention to the design of the physical container in which you are going to aggregate the parts. Kitting efficiency is impacted by both parts picking as well as assembly. Configure parts in the container in the order they will be used later in the assembly process. Doing so can greatly reduce assembly time. Another reason to optimize the container is that pickers will be able to quickly confirm visually whether any parts are missing.



Tip: By arranging parts in a logical sequence in the kit container, you contribute to a more efficient assembly process. Assemblers won't have to waste time search for the correct part. Assemblers will also be able to quickly confirm whether the assembly process was correct by looking at any leftover parts.

What

There are a lot of different assemblies you can kit. Some assemblies, however, don't lend themselves to kitting, either in whole or in part. One the primary "obstructions" can be part size. If you have an assembly that can be partially kitted you can pull the non-kittable parts separately as needed. Additionally, it is not uncommon for a kit to lack all of the parts required to assemble a single unit of the end product. Fasteners such as bolts and washers, etc. are usually not included in kits. We've already discussed how part size or assembly complexity might require a lengthier process in which one or more kits might have to be first assembled and then combined into the finished product.

Who

Who is going to actually kit components? Can you use employees? Can you use machines? In some situations, robotic picking and kitting are feasible. In other situation where components are too large or there is large variation in components lists, for example, machine kitting may just not work. There is much variety in selecting who will kit. Some situations call for assemblers to kit for other assemblers. Whoever you choose to kit, concentrate on delivering efficiency and accuracy when selecting the assembly team.



Where

This issue relates to both the geographic location of your kitting operation based on your choice of facility as well as the decision of where to establish the kit assembly stations within the facility. The answer to the first part is obvious if you only have one facility. It becomes more difficult should you have multiple locations spread across two or more states. The location within your facility depends on your picking process, the availability of physical space in which to assemble kits and store the finished work, and the proximity to the shipping dock.

CONCLUSION: GETTING FRIENDLY WITH KITTING

Kitting and assembly are essential elements of the modern distribution business. Just about every contemporary product is shipped to the customer with an instruction manual and some sort of accompanying CD or DVD. Kitting is here to stay and a great opportunity for you to win business if you aren't already providing this value-added service.

Recognize, though, that one of the biggest limitations with kitting is the risk of moving forward with a poorly designed system. The benefits will rapidly morph into profit-sucking problems and disappointed customers. Unsuccessful implementations are costly. You'll likely end up with a high percentage of incorrect kits, persistent quality issues, and unnecessarily high labor costs. In contrast, a well-planned and implemented kitting operation closely aligns with the theory and practice of lean distribution and production.

Chapter Thirteen: Picking

In our recent Best Practices for Putaway chapter, we discussed how to efficiently move items from receipt to storage. Gazing at the inventory now stored throughout your warehouse, what are you going to do when an order comes in? With some industry estimates suggesting that order picking represents more than 60% of warehouse operating costs, few warehouse management decisions have as much effect on your profitability.



ROI Opportunity: The average warehouse or distribution center will have many more shipments than receipts so if you have to choose, concentrate on picking optimization over receiving optimization.

In this chapter, we'll look at Best Practices for Order Picking. We'll look at various strategies, planning issues, and options you can investigate when planning your own picking design. (We'll also touch on technology options but only briefly. In the next chapter, we'll dive down in much greater detail into picking methods and their relationship to diverse picking technologies that range from cheap and expensive, to decades-proven and cutting edge).

The modern warehouse and inventory business is much affected by the sense of immediacy and instant gratification that characterizes the age of the modern consumer. Your customers probably have a much greater expectation of short order cycle time and prompt delivery than ever before. Whereas same-day shipping was very rare decades ago, customers now expect much shorter cycle times, in addition to high degrees of accuracy. To deliver on these expectations, you need to evaluate how picking integrates into the receiving and shipping processes that bookend it and try to optimize the overall process.



Tip: Optimizing picking will deliver big returns to your operation because picking labor expenses are such a big proportion of your total warehouse costs.

PICKING STRATEGIES: SUCCESS BEGINS WITH PUTAWAY

Efficient picking begins with efficient putaway. By doing an efficient job in choosing where and how to position inventory items on shelves racks or in bins, you set yourself up for successful picking.

(If you haven't read the Best Practice chapter on putaway yet, read it first so that that you'll have more contextual understanding of the information that follows below).

OK, now that you understand what you should be doing as far as putaway, let's look at some of the factors that will affect your decision on which picking method to implement in your operation.

- **What product or types of products/items are you shipping?**
- **Are you picking pieces, cases or pallets?**
- **How many transactions do you expect to pick per day?**
- **How many orders and how many picks comprise a typical order?**
- **How often are individual SKUs included in an order?**

Some warehouses can use a single picking method. To truly optimize most operations, however, management may

well have to use a combination of picking methods. Additionally, your picking method should evolve as products and the types of orders you receive grow in their diversity and volume.

DEFINING YOUR KEY PICKING OBJECTIVES

As you design your picking operation, think in terms of three key objectives; increasing productivity, increasing accuracy and reducing picking cycle time. Here are definitions for each:

Productivity

This is the answer to “how many?” Productivity within a piece pick warehouse is generally defined as the number of items you can pick per hour. Warehouses using case picking and pallet picking will typically measure cases per hour, and pallets per hour, respectively.

Accuracy

This is the answer to “Did you get it right?” How many picks does your team do correctly? What is the percentage of shipments that go out correctly? Many of the decisions you made far upstream—long before the moment when the picker is starting to fill an actual order—will affect your accuracy rate. You need to think of how your labeling design (readability) and label production (legibility and robustness to harsh environments), as well as packaging, warehouse layout, storage design, environmental lighting, and the actual pick method(s) you choose work together because they can all influence (positively or negatively) the picking accuracy.

Cycle Time

This is the answer to “How long did it take?” This is simply the amount of time it takes to move an order from the moment of entering it into your system, to delivering it to the shipping dock.

PRODUCT AVAILABILITY AND LOCATION ARE CRITICAL

A few words on product availability. Firstly, you need to regularly review your slotting processes to ensure that they aren't harming your picking. This is particularly important if your operation uses fixed picking locations.



Note: You're probably doing more shipping than receiving. Emphasize process optimization where it will deliver the biggest return to your operation as a whole. (Reread the first ROI Opportunity again). This means picking. Don't fall into the trap of letting your slotting optimization decisions negatively affect your picking. It can happen without realizing it.

Another point to remember is that shelves and bins need to be filled. Make sure that whatever replenishment system you use keeps bins full. In an ideal world, this means that your Warehouse Management System (WMS) will only create pick lists containing in-stock items. If bins are empty, your pickers will have to stop their picking to restock through “emergency replenishments.” Not surprisingly, your pick rates will plummet. You really don't want pickers wasting their time as they correct or respond to errors in your inventory system.

THREE PRIMARY PICKING SYSTEMS

Which picking system should you use? There is no golden rule other than pick the system (or hybrid system) which meets your needs.

Piece Picking

In piece picking, you pick individual items and put them into shipping containers (usually cartons or boxes). You often find this method in warehouses that inventory lots and lots of SKUs. When you have large quantities of items to pick (think in terms of thousands or tens of thousands of SKUs), this is typically what you will use. Your classic mail order house or parts distributor stores its inventory in fixed locations on static shelving or racks. Pickers fill one order at a time. It is a basic system that works well in warehouses that fulfill a smaller number of orders per day. As volume grows, however, the system can begin to fall apart due to excessive picker travel time and aisle congestion.

Case Picking

Case picking works for operations that aren't filling orders with open box picks. A warehouse using case picking usually has fewer product SKUs from which it fills its orders as well as higher picks per SKU. You'll see a lot of pallet jacks or pump trucks in these operations as well as motorized pallet trucks to retrieve cases stored in racks.

Pallet Picking

If you're shipping pallets out, then you're using some form of pallet picking. You've also got a lot of choices as far as storage configurations and equipment and the lift trucks/towmotors your pickers will use to retrieve pallet loads.

PICKING METHODS

Although we'll discuss them at length in the following chapter, there are five common picking methods: basic picking, batch picking, multi-order picking, zone picking and wave picking. (In the next chapter, as we drill down into each picking method, we'll discuss the pros and cons of each, as well as the individual technologies and equipment you'll need to implement them).

TECHNOLOGIES IN PICKING OPERATIONS

To give you an idea why we need a complete separate chapter to explore best practices in picking methods and the myriad technologies to implement them, here are just a few of the choices:

Automatic picking machines

The use of fully automated picking machines is generally restricted to operations combining high volume with high accuracy requirements.

Automatic storage and retrieval systems

An expensive, high retrieval system of rows of racking used in both putaway and picking.

Automated conveyor and sortation systems

Automated conveyor systems and sortation systems are generally suitable for large-scale piece pick operation.

Carton flow rack

Similar to static shelving, except that the shelves are angled downwards, enabling gravity feed to the pick face.

Carousels

You've probably seen the horizontal carousel version of this used in your local dry cleaners. A system of hanging racks that hold storage bins. There is also a vertical carousel version found used in laboratories and specialty manufacturing operations, but rarely used in regular order picking operations.

Pick-to-light

Pick-to light systems consist of lights and LED displays for each pick location, using software to light the next pick task and display the quantity to pick.

Static shelving

Most commonly found in piece pick operations, this is best suited for low-volume small parts operations.

Voice and speech recognition

Many industry experts anoint this as the biggest technological innovation since the 1970s. While increasingly popular for inventory and receiving, it has tremendous picking application. Voice directed picking can have a huge impact on increasing productivity and accuracy.

QUALITY CONTROL: VERIFYING YOUR ORDERS

Regardless of the picking system you select and the method and technology needed to implement it, you need to have some process of verifying outbound shipments. You need some checking method to catch mistakes before they reveal themselves when the customer opens the package. Did you get everything right? Pickers will make mistakes. It is unavoidable. What you should aim for is catching these errors before the goods leave your warehouse. Ideally, your quality assurance or quality control system will catch them while the picker is in front of the picking slot. If your system requires some kind of data entry (ID bar code or UPC code scanning, for example), you'll reduce shipping errors dramatically.



Tip: If you're using paper documents in your picking, make sure they are clear and easy to read.

PLANNING YOUR OWN PICKING SYSTEM

You need to understand the present and project into the future. Similar to many of the other best practices we've already explored in previous chapters, you need to analyze existing data to select and implement the best picking systems and methods. Some of the metrics to analyze include: total picks and orders, quantity and picks per order, and picks per SKU. Projecting future growth is really, really important, especially when you are considering installing automated systems. They can be very expensive--and generally have capacity limitations. In contrast, if you use manual picking methods, you can usually just hire more people when business expands. If your automated system is maxed out and business volume jumps, you have a problem.

If you take nothing else away from this chapter, understand that your picking system must minimize walk time and product handling. Each unnecessary footstep taken by a picker reduces optimal efficiency, as do multiple touches of items. The simplest and easiest way to avoid these situations is to locate product by pick frequency. The center of your picking world should be those items that comprise the majority of your orders. By analyzing your data, you may learn that a small percentage of items comprise half or more of your orders. Stock the fastest moving SKUs as close to the pick point as possible and at easily accessible heights. Consider picking from both sides of the aisle, using small pick facings as well as using batch picking, which is picking multiple smaller orders in one trip. Put slow movers further away from the action.



Tip: Teach your order pickers to pick and pack at the same time. Train them to place picked items correctly in a ship-ready box. You'll be able to use fewer packers, as well as ship orders faster.

SUMMARY

Picking optimization isn't a point in time; it is a constant process that requires investment (figuratively and literally) from everyone in your organization. While the technology part is critical—picking systems range from simple racks and shelving, to very complex systems that may incorporate multiple pick methods, and multi-million dollar investments in equipment—so is the human capital.

Make sure that your top and middle management are invested in the success. Don't just give lip service and then point accusative fingers when picking productivity and accuracy rates are lower than projected. On-going training and picking system review are mandatory as is some kind of rewards system for high achievers.



Note: Accurate inventory-by-location data is a prerequisite to efficient, successful picking

Remember that picking has an important effect on customer happiness so reward those who are productive, dependable, and accurate. By identifying and rewarding the high performers, you'll have a short (or long list if you have hired and trained well) of those employees best able to deliver when you really must. A similar focus on performance and accountability applies to operational efficiency. Establish order picking metrics that matter to you, such as inventory accuracy. Publish the results and trending data regularly so everyone is aware of how well the group is doing. Similarly, you need feedback to improve; It is essential to continual process improvement. Create a process of regularly soliciting feedback from your pickers to improve future performance.

Chapter Fourteen: Annual/Physical Inventory

OVERVIEW

In chapter eight, we explored the many benefits of cycle counting. Chief among them is the elimination of an annual physical count of your inventory. While cycle counting is our preferred inventory counting process, many companies still conduct annual counts. Acknowledging that many companies still conduct annual counts, here is our look at the Best Practices for an annual physical inventory.

BENEFITS OF COUNTING

Anyone who has ever planned or participated in an inventory count knows what a frustrating, tedious and time-consuming activity it can be. The actual process of counting requires you to remove employees from their regular jobs for hours, if not, days in every inventory location. Depending on your warehouse operation, this could affect shutdowns in other parts of your business such as manufacturing. While the frustration of counting every item, and hunting for items and material that are nowhere to be found or, once found, unidentifiable, can be acute, the organizational value of stock accuracy is considerable.

Whether through cycle counting or an annual tally, the accuracy of your inventory data enables your sales, customer service and financial management systems to operate much more efficiently and effectively. Your annual count confirms what you actually have in stock and then adjusts your database records to reflect reality. Do the on-hand product quantities in your computer reflect what is actually on the shelves in your warehouse? If your buyers or sales reps make replenishment decisions or customer promises using inaccurate stock balances, mistakes will happen.

When your database indicates less stock than there actually is, you'll end up ordering sooner than necessary and more than you need. You commit capital to products you don't need just yet. When your database indicates more stock than there actually is, you may not re-order in time and produce a stock-out. To help avoid both of these undesirable results, as well as satisfy tax obligations, and financial and insurance requirements, you need to account for the cost of your inventory.

Consider the opportunity cost of investing money unnecessarily in inventory. What would your return be if you took the capital tied up inventory and invested it elsewhere, possibly in a traditional conservative investment like a CD or treasury bill? If you're financing your inventory, how much interest are you currently paying the bank?

Look at the financial implications of the goods you store in your warehouse. If you're not sure how much you're spending to carry inventory, here are some of the places where your money is going:

- **Putaway costs**
- **The labor costs of moving material within the warehouse**
- **Percentage of building costs (including rent and utilities) for space used in the areas of your operation where you store inventory**
- **Insurance costs**
- **Physical inventory and cycle counting**
- **Inventory shrinkage (employee theft, for example), obsolescence and damage, etc**

Assuming you understand the value of inventory counting, but haven't yet implemented cycle counting, your only choice is an annual count. Let's make it as easy as possible by using the following inventory best practices and guidelines.

PREPARING FOR AN INVENTORY

That old saw, "no one plans to fail, they just fail to plan," applies to physical inventories. Plan and prepare well in advance. It will take less time so you'll save money. It will be more organized so your counting staff will be less frustrated. The results will be more accurate so the data will have more value.

Once you have scheduled a date for the count, have your sales team notify customers of the shut down or non-shipment period. Give customers a cutoff date for order placement to guarantee outbound shipping before the shut down. The advisory activities extend to your suppliers, as well. Tell them that deliveries will not be accepted during the count. Communicate this information to all transport or delivery companies that regularly visit the facilities participating in the inventory.



Tip: It is very difficult to hit a moving target so don't allow any movement of inventory during the count, except in very special cases.

In your advance planning, divide the warehouse into counting areas. Divide and conquer in little steps. Break the overall counting process up into a series of smaller counts. Repetitively counting five, ten, twenty, or thirty thousand products is tiring. Your employees can easily become overwhelmed and discouraged by the volume of data that needs to be collected.

A physical inventory is a "wall-to-wall" count of your warehouse so map it in advance. Create a map indicating the location of every shelf, pallet rack and all other places where material is stored. One of the best ways to increase accuracy is to assign counters by area in the warehouse rather than product lines. (It is more difficult to account for misplaced material when counting by product line).

Make sure all inventory is clearly identified and located in its assigned location. If you have multiple locations for the same items, consolidate them into as few locations as possible. By combining smaller quantities into larger aggregated units, you reduce their counting time. Preparation also includes a through clean-up. Clean up (lots of sweeping, aggregating and organizing) before you count.



Tip: You can't count what you don't have. Ship everything you can before starting your count. Pay particular attention to whatever items are located in your returned goods and vendor return areas. All items in these areas should either be returned to its proper storage location, returned to the vendor, repaired or thrown out before your inventory day.

To reduce shut down time, count as many parts or slow moving or bulk items as possible before your big inventory date. Once these have been counted, avoid double counting by tagging the containers with tags or brightly colored stickers to signify that the contents have already been tallied. (This tagging system works as long as there will be no material transactions prior to the physical inventory.)

MANPOWER NEEDS AND TRAINING

Inventory counting proceeds much faster and more efficiently when you have sufficient counters. Do you know

how many you will need? An easy way to find out is to conduct a small test count, recording the number of items counted and the time it took. Depending on your total number of inventory items or SKUs, and the projected number of days or hours available, you can calculate the number of counters you will need. When calculating your headcount requirements, don't forget to consider the number of data entry personnel you will need and the computer resources needed to support their work. This advanced personnel planning also includes selecting and training supervisors to oversee the counting, tallying, verification and discrepancy processes.



Note: A counting team can handle 50-100 items per hour. Items that need to be weighed or moved to count take longer. Boxes or cartons, of course, can be counted very quickly.

OK, now that you have determined how many counters you need, do you know where they will be on inventory day? That's right, an often overlooked point is the impact of vacation. Give everyone plenty of advanced notice to avoid overlap with employees' planned absences. At the pre-count training, make sure everyone receives an inventory playbook containing the inventory activity schedule, procedure details, and work list. Include an FAQ to answer likely questions. Who is responsible for each task? How are they going to count? What should they do when they have a problem? What method are you using to designate areas that have already been counted? Include the count sheets (or demonstrate how to use the data capture devices) they are going to use. Clearly specify how they should record quantities, reconcile errors or discrepancies, and handle emergency shipments. Make sure to conduct a similar training session for those responsible for data entry.



Note: There will always be items in your warehouse that you don't need to count such as packing supplies, miscellaneous items not considered as inventory, as well as warehouse equipment. Decide in advance what shouldn't be counted and use some kind of system such as colored tags to identify them.

To keep the information fresh, schedule these training sessions several days before inventory day. Don't schedule it more than a week in advance.

TECHNOLOGY AND COUNTING MATERIALS

How you choose to count may require investing in some technology such as bar code readers. If you choose the old school method of paper, you'll still need to buy necessary supplies (such as pencils, pens, markers, stickers, clip boards, calculators, scales, and the food and drinks to fuel the counters). Buy all of these items in advance. Depending upon what material handling equipment you already have in your warehouse, you may also have to rent or borrow equipment such as pallet jacks, forklifts, and ladders.

Much like the benefits we've discussed in the chapters on Best Practices for putaway, slotting and picking, automation can deliver important time reductions. Automation during inventory can appreciably increase accuracy of your data entry, shorten counting time, decrease costs if you use outside auditors, and reduce your shut down period.

Bar code readers

These are probably your best choice to automate your annual inventory. You can download data captured by readers directly into your computer system, eliminating opportunities for data entry clerical errors. If bar code is your technology of choice, make sure to affix bar code labels to all cartons. These labels should include an ID number, item description, unit of measurement, and quantity. The counter scans the item, and enters the unit of measure and quantity. Open cartons are manually counted, with the tally entered into a handheld computer.

Counting Card

If you are using paper, you are either using count (index) cards or counting sheets. The typical count card method prior to the actual day is to place one in each bin that needs to be counted. Counters progress through their assigned counting areas and note quantities on each card. Providing each counter with a supply of blank cards enables them to note incorrectly stocked material which then can be quickly relocated to its proper location following the count.

Count Sheets

This as old as old school gets. Up to 25-30 inventory items are listed on each page. Organize the items by location area and number the pages in the order they be counted. Use count sheets with caution if you have no other alternative because data entry errors tend to increase.

INVENTORY DAY

Good morning, grab a strong coffee; it is inventory day. Make sure that all shipments (both inbound and outbound) have been completed and recorded before your count. All transactions, including shipping receipts, location transfers, customer returns, vendor credits, cost updates and quantity adjustments, should have been entered into your system before you send your counting teams into the warehouse. With the pre-inventory books now closed, you're ready to start. (You shouldn't enter any transactions of any kind until your completely audited inventory is finished). The same thing goes for material movement, including outbound shipping or receiving. Don't move, send or receive any material while your count is in progress to avoid counting it twice or missing it completely. If you do receive emergency or rush shipments, consider quarantining them for post-inventory handling or putaway.

QUALITY ASSURANCE: THE QUEST FOR ACCURACY

We can't emphasize accuracy enough; if your count is inaccurate at the end of your inventory, you've wasted time and money. Physical inventories are only worthwhile if the resulting data accurately reflects the contents of your warehouse. Incorrect data is as valuable to you as no data at all so audit while your people are still counting.

As soon as counters are finished counting a specific area, have an auditor recount to verify the counts of selected products. You should have determined the recount threshold with your auditors in advance. Before you count, decide what error percentage will kick off a recount. Because they represent the most dollars flowing through your inventory, concentrate on verifying your "A" items. Correct your "balance-on-hand" numbers in your database as soon as the auditor verifies that the counts are accurate.



Tip: If auditing reveals several counting errors in the same location, have the assigned counting team recount the entire section. This won't make the auditor popular but everyone involved in your inventory needs to understand that accuracy is the most important objective.

Whenever there are important differences between on-hand balances (reflected in the pre-inventory total) and counted quantities, you should list these items on discrepancy reports and investigate them. Calculate the value of these pre-inventory and counted quantities and prioritize based on those with the largest spread. Remember that some errors have nothing to do with counting accuracy. Differences can be attributed to a variety of reasons such as data entry errors when the counts were originally entered into the system or even differences in the units of measure. Items may have been entered by counters in pounds whereas the database system has them listed by piece. Hopefully, you'll only make errors like this once.

AFTER THE INVENTORY: PREPARING FOR NEXT YEAR

Congratulations, you survived. Gallons of coffee and dozens of cheese pizzas later, you have lots of new and accurate data in your database system. Its time for a post-op debrief. Sit down and solicit feedback from everyone, regardless of their seniority. What worked? What didn't? If you are going to continue with your physical inventory (rather than change to a cycle counting program), who should or wants to perform which tasks the following year? Talk about how you can make your next physical inventory easier, faster, cheaper, and more accurate?



Tip: Create and maintain a physical inventory project folder/binder in which you keep suggestions, examples of counting sheets, results from previous inventories and how-to/best practices articles (such as this one) that you can reference 10 months later when it is again time to start thinking about counting.

WHAT TO AVOID

Here are some things to avoid:

Counting damaged or obsolete inventory

If you find damaged goods or obsolete inventory during your pre-inventory cleanup, return them to the vendor for possible credit, or assign them to a special storage location for post-count disposal. By disposing them as quickly as possible, you'll eliminate future storage costs.

Moving Misplaced Materials

Whenever counters find misplaced materials, they should count them, record the relevant information, tag them as counted and make a note that they're out of place.

MOVING FORWARD: IMPLEMENTING YOUR OWN INVENTORY PROGRAM

Think of managing inventory, rather than just storing it. The more material in your warehouse, the longer it takes to count. Make sure as you move forward that you prohibit paperless withdrawals from your warehouse. Enforce a company policy that every stock withdrawal requires appropriate paperwork, including product samples. When they are returned to stock, adjust your inventory. If they never reappear, charge the sales rep's account.

Finally, seriously consider eliminating your annual physical by replacing it with cycle counting. Reread chapter nine (*cycle counting) to appreciate the benefits of cycle counting as it eliminates the disruption of an annual count and increases the accuracy of your real-time inventory data.

CONCLUSION

Can you possibly be efficient and accurate without best practices? Can you be efficient without implementing an inventory and warehouse management solution that empowers companies to beat the competition, survive an economic downturn, increase performance, collaborate effectively, and provide thought leadership in the workplace? Why even bother debating the possible answers? The risk-reward scales are clearly in favor of "intelligent" change.

Let's recap by stating that, yes, organizational change is often difficult. Organizations, not unlike human beings, frequently resist change simply due to the fact that it is, indeed, change. Ignoring the potential benefits of replacing the status quo, many organizations prefer to maintain it because it is often easier to do nothing. In the short-term, doing or changing nothing doesn't cost anything. It neither requires behavioral change of employees nor casts possible judgement on the incumbent way of doing things.

It is important to acknowledge that there will be employees who don't want to move in the same direction as you. You may need to make some tough decisions if success and growth are your goals. In spite of this, be assured that when you decide to implement a series of best practices, it will be a life-changing event for you and those around you. Your successes will be newly measurable by greater efficiencies, more accurate shipments and satisfied customers, improved collaboration and morale, decreased labor, and a quicker return on investment.

The Penalty for Resisting Change

Choosing not to use, create, or learn best practices has severe consequences that may not be fully understood until it's too late. Your competition may surpass you, and you may lose a lot of good business alliances, customers, and people along the way. You may find yourself stuck in the same rut year after year and wonder how you've made ends meet this far. In the long run—assuming that competitors are progressively improving—resistance to change will ultimately imperil the livelihood of an organization and all who work there (including you).

For proof, look no further than our very own Detroit auto industry, which has been in a two-decade swan dive after a half century of ruling the global automobile marketplace. Would these auto manufacturers have been in far better shape had they more closely looked at (and implemented) the best practices that their increasingly viable overseas competitors were implementing in the 1980s and 1990s? Very likely. The same is true of the 3PL and warehousing industries. Remain beholden to what worked two decades ago and your fate will likely be similar to the Detroit auto industry. Avoid it, instead, by embracing change.

The most compelling argument in favor of change through best practices is that you mitigate risk by copying what has already worked. We aren't talking about going out on a limb like those a half-century ago who dreamt about putting a man on the moon. We're talking about copying what has already worked. It is not unlike countries such as India, Pakistan, and Japan that have more recently developed space programs, having the blueprint (or best practices if you prefer) of the American and Russian space programs to show them what to do and what to avoid.

In this spirit of risk management through imitation (a strategy that may have well saved Detroit from the spectacle of begging Congress for bailout support) we based this entire eBook on the premise of liberally borrowing effective warehouse technologies and processes from others. Trailblazing pathfinders took the original risks, and often failed. You can benefit from their labor for free, enjoying a more pain-free life.

It really is amazing to consider how much pain each warehouse actually endures to be successful. It is even more amazing when you consider that most of these pain points are not unique; they exist across the industry. Understanding where your particular bottleneck is, addressing these issues with a set of best practices, implementing a technology solution that changes with you without serious financial risk, is wisdom unfurled in this day and age when success is measured not only by money but by how well companies perform.

Doing Better and Finding Gold

Bringing change to the forefront can reveal hidden gems in your own organization. A positive change that enables a company to improve its processes is uplifting to those who want the company to succeed. You may even prompt future superstar employees to emerge from their shells.

Do you have employee like these, or others asking "How can we do better?" If so, take action. Best practice implementation in any organization should start with small improvements that ultimately turn into large (and in many cases) landslide events that move companies to success much faster.

While imitation is often cited as the sincerest form of flattery, it can also be vital to an organization's (meaning: your) future. Let the other guy spend the money and take chances. Leave it up to others to balance on the bleeding edge of change. Consistently search for new methods in your own industry and in those industries where you share similar practices or processes. Whenever the dust settles, pick and choose what worked elsewhere. This is the essence of best practices.

Stay tuned for more

As an enthusiastic participant in the 3PL and warehousing industries, we trust that you have enjoyed reading these chapters. In the coming months, we will publish version 2.0, adding additional best practice chapters, as well as profiling a number of SmartTurn customers that have seen tremendous results by implementing many of the recommendations you've read about in here in version 1.0. In these "tactical spotlights" we'll take you step-by-step through the projects, bridging from the theory to the tactical. We look forward to sharing them with you. Until then, embrace change and prosper.

■ About SmartTurn

SmartTurn™ Inventory and Warehouse Management System and the SmartTurn Inventory Grid™ are the first true on-demand warehouse management systems to provide enterprise-class functionality at a fraction of the cost of traditional license-and-install software. Designed for quick implementation, ease-of-use, real-time inventory accuracy and warehouses performance, the SmartTurn system provides visibility on every item across single or multiple warehouses. Founded on the premise that software should be smart, simple and safe, SmartTurn's customers span the value chain of most industries to include manufacturers, wholesalers as well as 3PLs. SmartTurn is privately held and backed by leading investors, NEA and Emergence Capital Partners.

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