



SUPPLY CHAIN NETWORK SOLUTIONS

*Net@Work*

# IDEAS FOR IMPROVING WAREHOUSE PERFORMANCE

Quarters In The Couch: Low Hanging Fruit



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5S has long been part of successful manufacturing processes. A natural extension is applying these principles in warehousing and distribution.

The pillars of 5S are:

- Sort – eliminate whatever is not needed
- Set In Order – organize, identify and arrange everything in a work area
- Shine – regular cleaning and maintenance
- Standardize – make it easy to maintain; simplify and standardize
- Sustain – maintaining what has been accomplished



# QUARTERS IN THE COUCH – LOW HANGING FRUIT

## EXECUTIVE SUMMARY

When you were little, or maybe not so little, did you ever discover nickels, dimes, or quarters under the couch cushions? Or maybe you recently got out the new season coat and found a ten dollar bill in the pocket. Either way you were a bit excited and proud of your serendipitous endeavors. Making improvements in the warehouse can be similar to finding quarters in the couch. The improvements are there, you just need to look.

For over 20 years I've had the opportunity to work with some great minds in warehousing operations and supply chain management, and learn from their experience. Early in my career I worked with large high volume distribution centers designing operations to efficiently meet current and forecasted customer demands. As supply chain technology evolved and warehouse management systems (WMS) became a standard practice for modern facilities, I noticed it was more important than ever for companies to have a solid foundation of processes and procedures to maximize their investment in technology. Today, I frequently meet with managers of manufacturing raw materials warehouses or small to mid-sized finished goods distribution centers considering technology but who could first benefit from improving their fundamental processes or even replacing their processes all together. To help managers identify where to look for improvement ideas, I've reached out to my network of great warehouse resources to develop a living list of low hanging fruit ideas for improving warehouse performance.

Management has 3 primary tools at their disposal to help improve productivity, velocity, and customer service levels: Labor, Space, and Equipment. Frequently two other elements, technology and inventory, are debated as potential tools for a warehouse manager. For purposes of this presentation we are purposely avoiding the discussion and application of automated material handling technology. Regarding inventory, I propose a typical warehouse manager has very little influence over the level and type of inventory in the warehouse. You are generally told what is coming in (by purchasing or demand management) and what is going out (by orders and customer service). Your only influence is to protect the inventory in your position and make it easily accessible to satisfy customer demand.

So let's review the low hanging fruit concepts you can consider to help improve the efficiency of your warehouse operations and find quarters in the couch.

As we discuss improvement ideas, keep these key points in mind:

- Labor costs typically consume at least 60% of a warehouse budget.
- Pick labor can consume up to 70% of warehouse labor.
- In a typical supply chain the warehouse is the last place to touch the product and potentially impact customer service levels and perceptions.
- You are paying for space even if you don't use it, or if you use it for non-active product.
- And as shorter delivery lead time expectations become the norm, your operations should be setup and organized to be able to rapidly respond to changes.

As you think about process improvement ideas and changes you can make to your operations, try to prioritize the projects based on impact to these value levers.



## HIRE A VETERAN

This is not a political statement. Rather a non-statistical observation. From my experience, people with a military background make better warehouse managers. I'm not certain if it's the type of people attracted to military service or if the military trains people how to be organized, but people with a military background tend to be more prone to organization and implementing our first topic, 5S principles.

## APPLY 5S PRINCIPLES

5S has long been part of successful manufacturing processes. A natural extension is applying these principles in warehousing and distribution.

The pillars of 5S are:

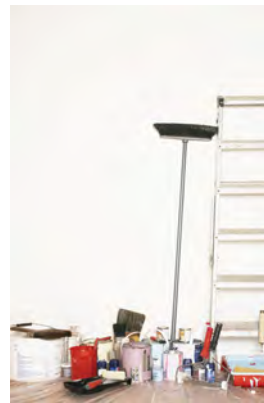
1. Sort – eliminate whatever is not needed
2. Set In Order – organize, identify and arrange everything in a work area
3. Shine – regular cleaning and maintenance
4. Standardize – make it easy to maintain; simplify and standardize
5. Sustain – maintaining what has been accomplished

At its core 5S supports establishing a visual workplace and is a part of Kaizen — a system of continual improvement — a component of getting lean.

The 5S program focuses on having visual order, organization, cleanliness and standardization. The results you can expect from a 5S program are improved profitability, efficiency, service and safety.

### Set In Order & Shine

In the warehouse, the easiest improvement you can make is to keep things clean and organized. Any warehouse can be made more productive and efficient by simply making sure the operations are well maintained, organized, and clean. A warehouse manager once told me the two best tools he had available were a paint brush and a broom. His point was work flows more fluidly through the facility when aisles, storage sections and processing functions are clearly marked and maintained. A dirty, cluttered and disorganized facility is invariably more costly to operate. It doesn't take much to mark aisle boundaries with a yellow line. Even if the layout is not ideal, at least you will have some indication if pallets and equipment are miss-stored and potentially blocking work flow.



Consider a large parking lot at a retail store. On a clear summer day you may be able to get 100 cars safely parked in the lot. How well utilized is the same parking lot when it snows? Chances are you will get up to 25% fewer cars in the lot primarily due to drivers not seeing the marked spaces and essentially parking wherever they want. The same concepts apply to warehouses and are a great first step in implementing a visual management system.

Keeping things clean helps support pride in workmanship and improves safety. At a minimum buy a large rugged garbage can, shop broom and dust pan to place at the end of every other aisle. This will allow operators, managers and other employees to keep the aisle clear of debris. Some companies go so far as assigning specific sections of the warehouse to a team and post the team information at the end of the aisles. The teams are responsible for keeping their sections clean and maintained.



Example 1

## Knowledge Nugget

Some of the cleanest and well maintained facilities I've seen have been managed by ex-military personnel. Perhaps it is the way they think, the way they were trained or their behavioral characteristics. Whatever it is, if you can't hire an ex-military resource to run your operations, try hiring someone who thinks like ex-military.

**I have CDO...  
it's like OCD but  
all the letters are  
in alphabetical  
order as they  
should be.**

**Example 2**

There is efficiency in order. In a warehouse there should be a place for everything and everything should be in its place. The warehouse should have clearly marked areas for traffic, processing and storage. This will help ensure product is stored properly, product is kept secure, and the work environment is safer.

### Safety



Speaking of safety, I hosted a lean tour of a large distribution center in Atlanta. Along with seeing many lean process ideas I learned they had a strong focus on employee safety. For instance, one thing everyone did (and we received training pre-tour) was the practice of Stop, Look and Point before your crossed an active equipment travel aisle. This is a practice they adopted from Toyota.

<https://www.youtube.com/watch?v=IGWKS7bOl8o>

**Example 3**

On a trip to England to observe warehouse practices, I learned all employees and guests in the warehouse are required to wear safety vests to make them more visible to equipment drivers. While this is a regulation in England, I expect it is something you could easily do in your operations to help ensure employee safety.

### KNOWLEDGE NUGGET

1. Stop...walking...so you can focus on your surroundings
2. Look...in all directions of vehicle traffic including both ways on a one way lane
3. Point...after making eye contact with any lift driver(s), use visual pointing to:
  - indicate which way both/all are intending to go,
  - indicate who is yielding right of way and
  - confirm the pedestrian(s) given right of way proceeds

### Layout

Warehouse layout can have a big impact on labor productivity and space utilization. For example, aisles should typically run the length of the warehouse from end to end without obstructions or dead ends. You can also consider adding cross aisles. A properly positioned cross aisle can reduce travel time from 6 – 13%. Keep in mind the aisle does not always have to be down the middle of the warehouse. Skewing the aisle toward the front or having aisles at less than 90 degrees tends to reduce travel time more especially with an ABC slotting strategy.

### KNOWLEDGE NUGGET

See how the Fishbone and Flying V layouts reduce pick time from 12-18% @ [www.kevingue.com](http://www.kevingue.com) – research – aisle design.

But keep in mind it is possible to have too much of a good thing. More cross aisles equals reduced travel times. Too many cross aisles equals reduced storage density and number of bins. Effective cross aisle use is a balance between travel time and space utilization.

### Standardize Bin Numbering

To help reduce confusion and inefficiency make certain to implement a bin numbering system that can be used to easily and systematically identify each warehouse bin. A numbering schema utilizing some form of identification for the zone, aisle, bay, level, and position is ideal. Additionally, all bins should have a common reference point to allow an operator to generally identify a bin. Think about the Eisenhower National System of Interstate and Defense Highways, or Interstate Highway System, in the United States. The numbering system can offer valuable clues to your bin and direction. For example (Figure 1):

**Figure 1**

### KNOWLEDGE NUGGET

When planning bin addresses, factor in expansion potential. For example, rack level assignment should ascend from the floor; A, B, C or 1, 2, 3, etc.

Within each shelving or rack-section level, assign numbers to each position, ascending from 1 to "n", from left to right as you face the section.

- One or two digit even-numbered Interstates are always east-west routes. The numbers increase from the south (I-4) to the north (I-96).
- One or two digit odd-numbered Interstates are always north-south routes. The numbers increase from the West Coast (I-5) to the East Coast (I-95).



You may not need the sophistication of a 47,000 mile network but having some reference and logic should improve efficiency.

### Creative Labeling to Save Time

When it comes to assigning identifiers to bins (labels) there are simple things you can do to make reading the labels easier.

In many warehouses labels include a bar code identifier used for scanning by a radio frequency (RF) mobile device. In these instances the labels should be positioned for line of site scanning by the RF device. Even if you use long range scanners that can reach up to 40 feet, your operator still might have an issue if they are not in the correct position to effectively scan the label. This is especially true for high bay rack storage and labels positioned over large bulk areas. Take for example high bay rack storage. If labels are placed on the beam below each pallet position, operators may not be able to easily scan the upper bins from the ground floor. If the operators are working with man-up order pickers, the issue is resolved by going up to the bin level and scanning the label. There are, however things you can do to allow easier scanning from the ground. For example, you can either place the label on the beam below the bin to make it more easily accessible from below or hang an angle placard from the bottom (Example 4).



**Example 4**



**Example 5**



**Example 6**



**Example 7**

Alternatively you can put all the labels at the ground level (Example 5). In this scenario, the operator identifies the correct level, scans the corresponding label, then proceeds with completing the task.

For bulk areas, companies either apply bin labels on the floor or hang them from the ceiling. The challenge with floor labels is they tend to wear away over time while hanging labels are up out of the way. However, hanging labels create another challenge

if the operator cannot access the aisle from multiple sides. If they enter the bin lane from the front they can easily identify and scan the bin label. However, if they enter the lane from the other side, they will need to manipulate their body and scanner to effectively see and scan the label. To get around this, you can hang a two sided angled sign (Example 6) or consider applying the label to a piece of PVC pipe as opposed to a flat angle bracket. (Example 7) The curved nature of the pipe will allow the operator to identify and scan the label from multiple sides.

### 90% Savings

I have a customer who needed to label all their bins. They received an estimate from a traditional labeling company for \$5000. They ended up using a web service to create their own label format then generated a PDF version of the label. Next, they sent the PDF files to their local print company and had all the labels printed for \$500. A 90% savings. Granted creating labels is not an on-going expense, but even small savings can add up.



### Lego Layout

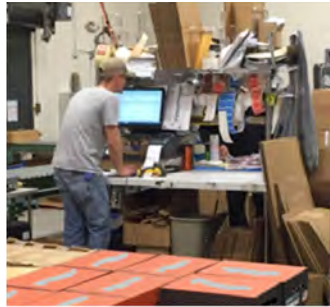
I attended a presentation (Fueling the Fire of Kaizen Throughout the Lean Enterprise) by Mark Preston, a Lean Leadership expert. Among the many interesting concepts he presented was the idea of a Lego Layout. A Lego Layout is a scaled three dimensional representation of a work center or facility. The idea is to create a model of the work environment and allow operators to conceptualize the work flow. With the model, team members can then begin to make system wide or local work area process improvement recommendations. While this model should not replace an actual scaled layout drawing of the facility, it does inject a level of fun and creativity into an otherwise drab two dimensional approach. Operators will tend to be more engaged, previously unidentified ideas could result, and the finished model, strategically placed in the lobby should generate much interest and discussion with visitors.



### Involve employees

The most valuable resource at your disposal is usually the people who work in the warehouse. By asking employees for input on ways to improve the operation, you are moving to the real source of how the warehouse operates and where the real issues lie. If anyone has ideas on how to improve the warehouse, it is those workers on the front line. Either formal or informal processes have been successful in gathering information from warehouse staff that has improved operation efficiency in many companies. Involving those closest to the operation not only generates ideas but increases the likelihood of a successful implementation.

As an example, getting employees involved in designing pack stations should result in productivity improvements for the packing function. Getting the employees involved to help define the proper size, height, and configuration will make a big difference in their attitude and performance. In this image, it looks like the above average height operator is slightly bending to access the computer workstation. My guess is at the end of the day he will have a sore lower back. I expect the operator would not object to investing in an adjustable height table.



**Example 8**

A focus on improving the functions where people spend most of their time will maximize the potential savings. During facility tours it is common to see pack stations tailored to the operators preferences. For example, tools will be positioned in specific places, notes will be posted where they are easily referenced and supplies are readily accessible. Take a look at your work stations and see if there are ideas that can be implemented in other areas or operations.

And encourage employees to take ownership and accountability for their work areas. I see many warehouses where different work sections are cleaned and maintained by operators. Many times a banner is seen at the end of an aisle saying this aisle or section is maintained by the employee, with their picture.

This area  
proudly  
maintained by  
Chris Barnes



One of my customers demonstrated how one plus one can be less than two. They frequently ship multiple individual full cases to customers. Through a rough analysis they determined two full cases taped together cost less to ship than two individual cases. Of course this assumes both cases are going to the same ship to address.



**Example 9**

### MEASURE

Most people want to do a good job, know where they stand, and be recognized for their performance. One easy way to accomplish this, and also improve productivity, is to develop a simple process measuring overall performance and post results in the warehouse. It does not have to be a complicated process. Simply measuring and recording the overall performance of the warehouse can generate positive results. If possible, individual performance can be added as a metric (standards) later after the organization, group, or team's key performance indicators (KPI) are in place.

### Key Performance Indicators

Are you a best-in-class operation? Do you have a bad warehouse? Not sure how you stack up against your competitors? One of the best ways to answer these questions is to begin the process of benchmarking. Merriam-Webster defines benchmarking as "the study of a competitor's product or business practices in order to improve the performance of one's own company." Basically, benchmarking helps determine how good 'good' is, and how they are making the standard.

Benchmarking helps your company to compare how well you are performing against others and identifies whether your company is at a disadvantage. Whether you are benchmarking to increase productivity or reduce operating expenses, driving best-in-class performance may increase efficiencies, profitability, and improve customer service.

While the core of Benchmarking involves developing a better understanding of how your operations and processes are performing relative to others, these same metrics can be used to establish a baseline for improvement. Whether your goal is to become the best of the best warehouse, or simply make small incremental improvements, you should consider starting by establishing current state measures of common warehouse performance metrics.

Table 1 outlines the top warehouse KPIs from a recent survey done by Dr. Karl Manrodt and highlights two performance quintiles; Best Practice (BP) and Median. Best Practice represents the top 20% of all survey responses while Median is the actual median of all respondents.

Measure	BP	Median
On time shipments	>= 99.8%	98.5%
Order picking accuracy	>= 99.9%	99.50%
Bin utilization	>= 92%	85.0%
Annual Workforce Turnover	< 0.8%	6.8%
On time ready to ship	>= 99.9%	98.6%
Peak warehouse capacity used	>= 100	98.6%
Peak warehouse capacity used	>= 99.8%	98.0%
Dock to stock cycle time	< 2.3 hours	9.1 hours
Inventory count accuracy bin	>= 99.8%	98.5%
Fill rate – Order	>= 99.83%	98.7%

**Table 1: Top Warehouse Performance Metrics**

While different facilities will have different metrics, a good place to start defining key performance indicators, or KPIs, is the DC Metrics report by Dr. Karl Manrodt. You can contact Dr. Karl direct for more information on this report at: [karl.manrodt@gcsu.edu](mailto:karl.manrodt@gcsu.edu).

### Standards

Once organization-wide KPIs are in place, you should next consider implementing individual performance metrics (standards) to support the KPIs, and incent individual performance.

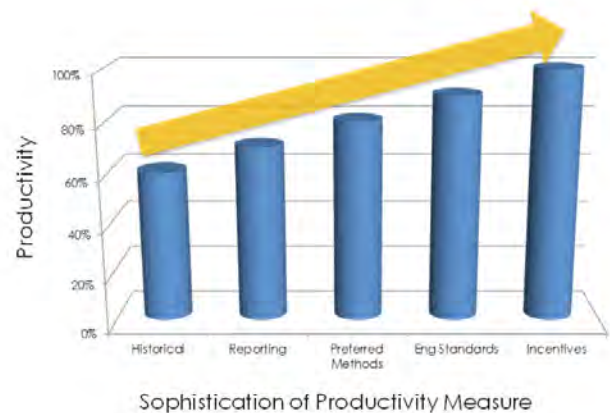
A standard is:

- An accurate measure of a specific operation(s) used by management to communicate objectively with employees.
- A work measurement tool providing an accurate means of comparing what happened to what was supposed to happen.
- A means of quantifying the time required to perform a unit or units of work utilizing defined methods and procedures.
- A minimum expectancy and quality level required on a given work function.

Regardless of the equipment and technology you use, people and processes make the biggest difference driving a significant majority, typically 60-75% of an operating budget.

Establishing and implementing standards covers a spectrum of sophistication and is an evolutionary process starting with establishing a historical baseline for performance. However, using historical performance metrics is similar to driving while looking in the rear-view mirror. You may get where you are going but the trip will likely take longer than needed. Referencing

Figure 2, companies using only historical performance data commonly realize 50-60% labor utilization/productivity as a group.



**Figure 2**

Once historical performance data is available, companies can trend and report the information to operators as a step to move productivity into the 65-75% range. The improvement is due in part to creating a competitive atmosphere among operators and quite possibly the Hawthorne Effect (people tend to perform better when they think they are being observed).

### KNOWLEDGE NUGGET

#### TRAINING, TRAINING, TRAINING.

Sit all your associates down to review a function (such as case pick) and ask them to walk you through the exact procedure. If answers vary even modestly, then it's time to re-train.

With historical performance reporting in place, next is defining the best way to perform a task under normal operating conditions, or a preferred method. A preferred method is a user friendly description of the best way to perform a task under normal conditions and is supported by a detailed list of instructions on how to best complete a task. These instructions then become the basis for employee training documentation. Keep in mind the preferred method may not always be the fastest or easiest way to perform the task but is established to balance productivity with repeatability, accuracy, and safety. With preferred methods defined and implemented, companies typically realize 80-90% productivity.

With preferred methods in place, companies can then begin to experiment with engineered standards and incentive programs



to drive productivity into the 95-110% range. However, implementing credible engineered standards and fair incentives typically requires investment in technology to support real time tracking and management.

While picking consumes a majority of the labor budget and can be improved with standards, all other functions in the warehouse can benefit as well. Table 2 summarizes warehouse functions and the example benefit ranges from reporting performance through to implementing incentives.

Function	Range
Receiving	10 – 25%
Put-away	10 – 15%
Picking	15 – 100%
Replenishment	15 – 25%
Packing	15 – 40%
Loading	15 – 40%

**Table 2: Typical Performance Improvement by Function**

### PREFERRED METHOD EXAMPLE

Whenever a UPS driver leaves his seat, he places his package car key on his pinky finger. Here's why: In 1921, UPS began to create work methods for its drivers to ensure their safety and get packages to their destinations faster. They found miss-placed keys were a common driver issue.

They devised the current method of requiring drivers to place the truck key ring on their pinky finger after unlocking the bulkhead door and retain the ignition key in hand before returning to the car. This frees the drivers' mind from thinking about which pocket the keys go into, and prevents drivers from accidentally locking the keys in the cargo area.

When you consider about 70,000 UPS drivers make an average of more than 200 stops per day all using this method, the saved seconds add up and those saved seconds become minutes throughout the day for each driver.

The methods and standards created by UPS's industrial engineering team come from years of careful measurement and study of what's most efficient and safest for the drivers.

### Warehouse Preferred Methods Applied



**VS**

Preferred methods can be easily applied in the warehouse resulting in immediate benefit. In this example, parking the pick pallet closer to the pick bin will result in eliminating 4 steps per pick. For an operator picking 1000 lines per day, this reduces the operator travel distance by 2 miles (2000 steps per mile). Whatever metrics you apply to improving your pick process, through training operators on preferred methods, the savings will be relevant.

SPACE UTILIZATION

Do you have too much warehouse space? Chances are you are either out of space or getting close to it. It happens all the time... inventory (and other stuff) tends to expand to fill the amount of available space. When you do run out of warehouse space there are many options to consider including expanding your warehouse, building a new facility, or leasing outside space. Alternatively there are many proven, low cost concepts you should consider to improve the utilization of your existing space.

Random vs. Dedicated Bins

There are two primary material storage philosophies...fixed or dedicated bins and random or floating. In dedicated bin storage, each individual stock keeping unit (SKU) or item is assigned a specific storage bin. A given SKU will always be stored in a specific bin and no other SKU may be stored in the bin, even though the bin may be empty. Dedicated bin storage is analogous to a classroom where each student is assigned a specific seat.

With random storage, any SKU may be assigned to any available storage bin. An SKU in bin A one month might be in bin B the next and a different SKU placed into bin A. Random bin storage is analogous to the assignment of rooms in a hotel. When a guest checks in they are randomly assigned a room (based on the guests pre-defined criteria).

The amount of storage space required for a SKU is directly related to the storage philosophy. If dedicated storage is used, a given SKU must be assigned sufficient space to store the maximum amount of the SKU that will ever be on hand at any one time. For random storage, the quantity of items on hand at any time will be the average amount of each SKU. In other words, when the inventory level of one item is above average, another item will have a below average level; the sum of the two will be close the average.

Often the storage philosophy chosen for a specific SKU will be a combination or hybrid based on where the SKU is in the storage process. A grocery store is an excellent example. Dedicated bins are used on the store shelves where the consumers can easily find what they are looking for, and not stored (on purpose) in any other bin (promotions excluded). In the back storeroom however, the excess stock is usually stored randomly, wherever there is a bin. Because combination storage bin is based on a mix of fixed and random storage, its planned inventory level falls somewhere between the fixed and random quantity.

Choosing one storage philosophy over another means making a number of trade-offs between space, accessibility, and material handling efficiency, Table 3.

	Dedicated	Random	Combination
Use of Space	Poor	Excellent	Good
Use of Space	Excellent	Good (if using technology)	Good
Material Touches	Good	Good	Poor

Table 3: Comparison of Storage Philosophies

Use of space in a dedicated bin model is poor because space for the maximum amount of inventory that will ever be on hand is allocated, although actual on hand inventory will normally approach the average inventory level. Therefore excess empty space and bins are common in dedicated storage. Random storage is extremely space-efficient because the space requirements are only 15% above the average amount of inventory expected on hand.

Material in dedicated storage has excellent accessibility. Blocked stock is not a problem because each bin contains only one SKU and the bin of each item is known (remains constant). Accessibility to stock in random storage can be good but requires more management especially if a materials tracking system is not in place or kept up to date. Without good management or a tracking system, using random storage will result in blocked stock, lost material and eventually obsolete inventory.

Dedicated and random storage score equally well for material handling. With either, inventory is typically handled during the put-away process and then again during picking. Combination storage is typical of a forward pick and reserve storage strategy requiring a replenishment flow. This replenishment adds another product touch as inventory is moved in smaller loads from the reserve (random) bins to the forward (dedicated) bins for picking.

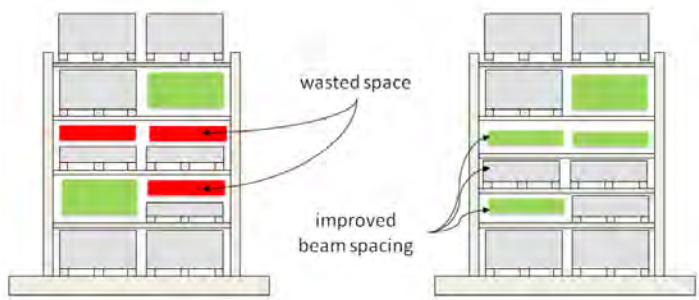
In summary, dedicated storage trades space efficiency for better inventory accessibility and vice-versa for random storage. Combination storage trades material handling efficiency for middle of the road efficiency in space and accessibility. Which is best for your operation is unfortunately not a clear cut decision and will depend on several other factors. The only general conclusion to be made is the poor use of space in a dedicated bin strategy is a big negative. Compared to the use of space in a random strategy, a dedicated bin strategy will generally require 65-85% more space. With the escalating cost of money, land and construction, few companies can afford to design fixed bin storage warehouse. This factor alone can justify the investment in technology to help manage a random storage warehouse.

However, occasionally efficient use of space is not a critical factor, so dedicated bin storage is preferred. For example, when the items to be stored are extremely small or extremely valuable, accessibility and accountability may trump space utilization. Few jewelers care about efficient use of space when they are storing and securing diamonds.

**Varied Bin Sizing**

An often-overlooked method of reducing space requirements is optimizing the product bin sizes. Many warehouse operations store and process a wide variety of product types and sizes. To effectively accommodate this variety, it is desirable to provide a variety of storage types and sizes. Trying to utilize only one type of storage media and bin size with a variety of products can lead to inefficiencies and low overall cube utilization.

For example, as seen in Figure 3, storing pallets with a consistent 44" pallet height into a 60" pallet storage opening is just wasting space. The right balance between tailored product bin sizes and flexibility results in improved space utilization.



**Figure 3 – Impact of Varied Bin Sizing**

Here is something interesting I saw (Example 10). This is small bin shelving where the customer is picking eaches. To create multiple bin positions on each shelf and help keep cartons segregated, they use plastic dividers Velcroed to the shelf. The dividers also serve as the label holder for the bin.



**Example 10**

**Storage Density, Velocity and Accessibility**

Reducing aisle widths is a good way to improve space utilization. Thought should be made to the number of aisles used in your facility. The number of cross aisles and people aisles should be assessed to maximize the utilization of the aisles. Table 4 compares various storage utilization improvement concepts against expected velocity and capacity constraints.

Concept	Velocity	Capacity
Dock Space	More	Less
Aisles	Wider	Narrower
Cross Aisles	More	Fewer
Rack Openings	Larger	Multiple
Storage Lanes	Shallower	Deeper
Processing	Larger	Smaller
Philosophy	Use the Floor (Bulk)	Use the Cube (MHE)

**Table 4 – Storage Capacity/Velocity Comparison**

**Aisle to Storage Space Ratio**

The ratio of aisle space to storage space is key when developing space saving ideas. One way to reduce the ratio is to block stack pallets of product on the floor two or three levels high. Block stacking requires enough inventory of the same SKU and product that can be stacked without damage. Floor stacking pallets four or five deep is common in operations with high stackable inventory per SKU. This ability to deep stack pallets with few aisles manages the aisle/space ratio to your advantage.

**Aisles**

Another area to review is the width of existing aisles in the warehouse. Most material handling equipment (MHE) is designed with a minimum aisle width or turning radius associated with particular style of fork truck. Make sure you don't overdesign the aisle width and waste potential storage space. In larger warehouses with many aisles of racking, a small decrease in each aisle width can result in additional rack bays for storage. But avoid making them too narrow and causing other operational issues.

Reducing aisle widths is a start to optimizing storage space. The type of lift truck used and the pallet parameters will influence aisle widths. However, with an assessment of aisle widths, you may identify aisles that can be reduced using the same equipment.



In other cases, you might consider the investment of narrow aisle (96" to 108") or very narrow aisle (44" to 66") industrial vehicles, such as reach or swing-mast respectively.



### KNOWLEDGE NUGGET

In a warehouse it is common for aisles/cross aisles to consume 30-40% of the space. Rules of thumb for space planning include:

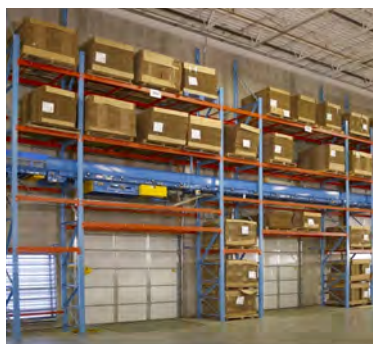
- Docks and processing areas = 15-30% of total space
- Aisles = product storage space
- Cross aisles = 20% of the aisles + product storage space
- Benchmark for storage capacity = 10 – 15 square feet per pallet

### Think Cubic Feet

The impact of using vertical storage space depends on your current storage clear height and product stack-ability restrictions. For example, in the beverage industry, a stack height limitation of one to two pallets is common. With these low stack heights, a simple 4 to 5 level pallet rack structure, using basic counterbalanced vehicles can drastically reduce the space requirements of the facility. In addition, the vertical space within a pallet rack structure should not be wasted. The lift-off height provided between the top of the load and the beam should be adequate but not excessive. The typical lift-off heights within a pallet rack structure range from 3 to 8 inches.

### Rack Over Doors

Most receiving dock doors are spaced far enough apart to permit racks to be erected and span the door openings. These racks can provide several levels of product storage above the clear height of the door opening. These racks can be used to store very slow moving products (i.e. packaging supplies and empty pallets).



**Example 11**

### In-Rack Tunnels

In warehouses where pallet rack is used, a missed opportunity exists if rack "tunnels" are not used over cross aisles. Most warehouses try to align rows of rack on either side of a main or cross aisle. The area above these aisles is wasted unless racking is installed bridging the aisle between the ends of rows of rack. Even allowing clearance for lift truck traffic, it is possible to add two or three levels of pallet storage.

### KNOWLEDGE NUGGET

As a rule of thumb, the reduced travel distances from using cross aisles or tunnels will improve picking efficiency up to 25%, far offsetting the resulting decrease in storage bins/space utilization.

### Bin Utilization

After you establish the layout and bin characteristics, the next job is to make sure you utilize all of the potential space in each bin. During tours, I frequently see instances where one or two cases are stored in a bin designed for a full pallet quantity. This is overcome by having a variety of bin sizes to accommodate the variety of storage needs on a product by product basis.

Another waste of space occurs in picking areas where only the front portion of the pick slot is utilized with empty space left behind. A formal slotting analysis should help identify areas of opportunity. Make sure the pick slot is designed to fit the cube movement of the SKU. It is impossible to attain 100% storage capacity on a daily basis but the higher percent you can maintain in established bins, the more space you will have available.

### Mezzanine

Although they can be costly to install, the option of installing a mezzanine makes sense in some situations. If you can find the right use for this type of space, you can double the footprint of the warehouse where you install the mezzanine. Issues such as product flow and the cost per square foot of space in your warehouse will determine the potential use of a mezzanine.

### KNOWLEDGE NUGGET

Measure both Absolute and Relative bin utilization. Absolute determines if there is any inventory in the bin and is a binary measure, 1 or 0, Yes or No. Relative determines how much of any given bin is full. Keep the measures simple - 0, 25, 50, 75 and 100%. As you walk through the warehouse, take a random sample to see how the facility measures up.

### Layout/Product Flow Review

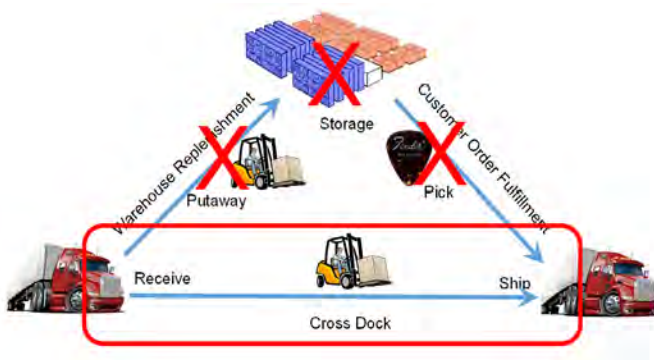
A proactive strategy for managing warehouse operations is to develop and maintain a scaled layout drawing. A periodic review of the layout will help you define the overall approach to utilizing space within the warehouse facility. Common space utilization tactics, such as storing products along outer walls, can be identified and integrated into the physical layout. Performing a review of your existing space utilization is advisable before investing in other options for handling space shortages. If not, you might duplicate bad space utilization practices into your next facility or expansion. Another key factor for improving warehouse space utilization is planning for future expansions at the start of any new building design. However, best practices organizations have 5 year growth plans including an evolving warehouse layout.

For example, the biggest decision on developing a new facility is using docks on one-side of the facility or both sides. Having docks on multiple sides of a building requires multiple staging areas for unloading and loading products. This leads to the majority of your facility being occupied by floor storage or wasted vertical space. If you can operate with docks on one side of the facility, then you can share the space required for unloading and loading.

### Cross Dock If Possible

The best way to improve space utilization and pick labor productivity is to not do it. Don't put product into storage and don't pick orders.

Cross docking is a logistics procedure where products from a supplier or manufacturing plant are distributed directly to a waiting sales order with marginal to no handling or storage time. You can potentially reduce storage requirements and improve overall labor productivity by moving product from the receiving dock direct to an out bound order. This practice is best supported with some form of technology to match inbound receipts with open outbound orders.



### Creative Storage Concepts

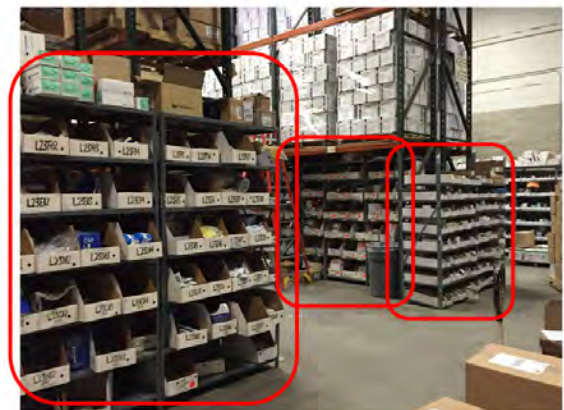
In this example, the company is providing small specialty products to end users. The products are related to food and beverage so the company was very focused on product

cleanliness and presentation. These products are stored in the same warehouse with products that tend to create dust. They came up with a creative and inexpensive way to keep the product clean and organized using basic containers you probably use at home.



**Example 12**

In this example, the company is using in-rack storage bins to store small items and improve space utilization. Notice they also have bin shelving at the end of aisles to take further advantage of this space. I encourage you to take a look at end of aisle space to determine if you can keep super high volume product there for picking, assuming the bins and people will not interfere with fork truck traffic.



**Example 13**

### KNOWLEDGE NUGGET

Slotting or Profiling in a warehouse is defined as:

"The process of identifying the most efficient placement for each item in a warehouse. Since each warehouse is different, proper slotting depends on a facility's unique product, movement, and storage characteristics. An optimal profile allows workers to pick items more quickly and accurately and reduces the risk of injuries."

Here is one more example of using in rack storage bins to store small items (Example 15). Because the overhead bins are more difficult to access (requires a man-up truck, wave picker or ladder) they are used for storing slower moving product. They use different size plastic bins to create 6, 18 and 36 bin positions per shelf. The cube movement analysis will help you determine the number and size of plastic bins required.



Example 14



Example 15

### Slotting (ABC Analysis)

Paying attention to the fastest selling items to make sure they are located in the most advantageous picking position will generate significant labor cost savings. If available space is a concern, slotting will also help improve storage utilization by focusing on the slowest movers to see if their assigned bin space can be reduced.

Slotting uses ABC profiling, 80/20 analysis, and cube movement data to keep high moving product in the Golden or Strike zones. Next we provide a simple example of how to reduce pick tour travel distance by 29% using a horizontal slotting strategy.

### KNOWLEDGE NUGGET

Slotting or Profiling in a warehouse is defined as: "The process of identifying the most efficient placement for each item in a warehouse. Since each warehouse is different, proper slotting depends on a facility's unique product, movement, and storage characteristics. An optimal profile allows workers to pick items more quickly and accurately and reduces the risk of injuries."

Benefits of a slotting exercise include:

- Improved picker productivity,
- Better pick accuracy,
- More efficient replenishments,
- Ability to better manage the work load across the facility
- and improved Ergonomics and safety

Here is an example of a product velocity slotted warehouse. Slotting attempts to keep fast moving, or "A" items closer to the point of use with slower moving items ("B" and "C") further away. In this warehouse, A items would be slotted or stored closer to shipping and in easily accessible bins, B items further away and C items the furthest away.

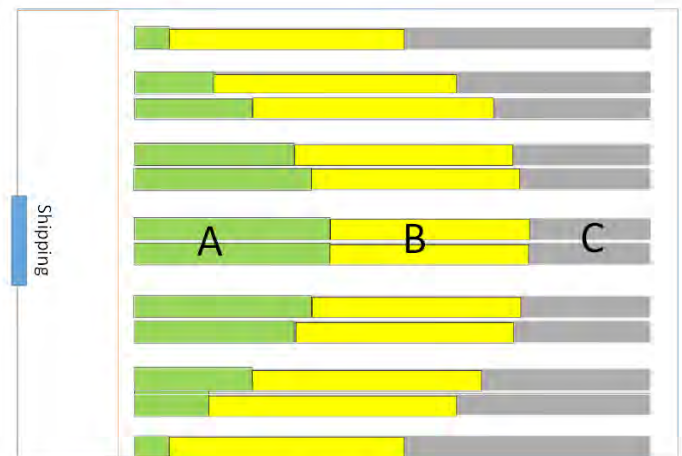


Figure 3

### The Ideal Shape of a Warehouse

**Q:** With the ABC slotting design theory in mind, what is the best shape of a warehouse?

**A:** To keep all product equally distributed around the shipping dock, the warehouse would be a circle with shipping in the center and product slotted in a bulls eye.

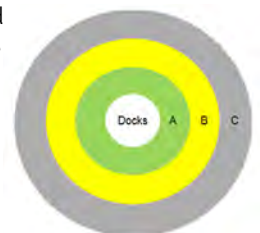


Figure 4

Of course, the under-ground tunnels required to get trucks to the shipping dock might be cost prohibitive.



### 66% Improvement

A key benefit of ABC slotting reduced average travel distance (and time) per pick. Figure 5 shows a 1,000 feet long warehouse with shipping/receiving on the left side. Without a slotting strategy product is randomly stored throughout the facility and the average pick travel distance is 1,000 ft; 500 feet in and 500 feet out occurring 100% of the time.

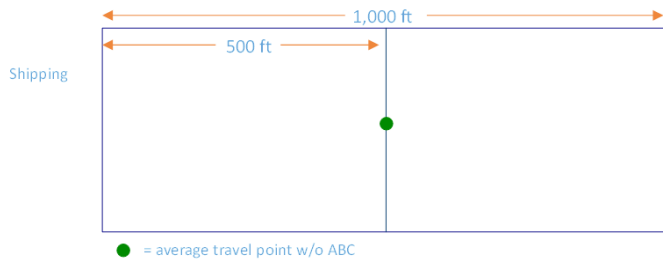


Figure 5

With slotting, Figure 6, the A items are 20% of the SKUs, generating 80% of the activity and consuming 20% of the space. Distance factor for A item picks is 160 ft; 100 ft in, 100 ft out, occurring 80% of the time.

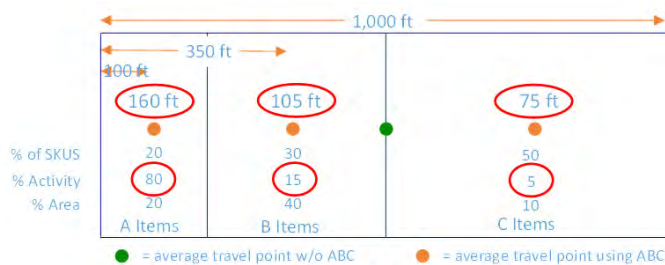


Figure 6

B items, the next 30% of the SKUs, will drive 15% of the activity and consume 30% of the space. Distance factor for B item picks is 105 ft; 350 ft in, 350 ft out, occurring 15% of the time.

And C items, or the remaining 50% of the SKUs, will drive 5% of the activity and consume 50% of the space. Distance factor for C item picks is 75 ft; 750 ft in, 750 ft out, occurring 5% of the time.

In total, the average travel distance to pick with a slotting strategy layout is 340 ft,  $160 + 105 + 75$ , for a savings of 660 ( $1000 - 340$ ) feet per pick, or 66%.

### Vertical Slotting

Slotting can also be applied at the micro level. You can increase picking productivity and improve order picker ergonomics by slotting your fastest-moving A items in the waist-to-shoulder or "Strike/Golden Zone" area of your storage media.

Looking at slotting from a vertical perspective, product is again located based on whether it is a fast (A), medium (B) or slow (C) moving item.

Referencing Figure 7, fast movers (A items) are the most popular products and should be the easiest to get to and retrieve. Slower movers (B and C items) are slotted overhead or on the bottom shelves. The Golden Zone refers to the area between the knees and shoulders where handling items is the easiest and requires the least amount of bending/stretching.

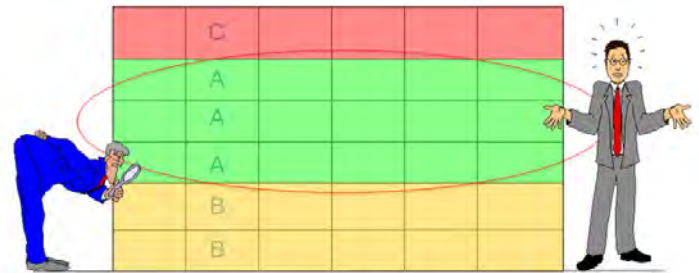


Figure 7

Utilizing The Golden Zone will help make sure fast moving SKUs are accessible and require minimal effort for the operator to pick. This minimizes the operator reaching, bending, and lifting that leads to worker fatigue. Picking from the Golden Zone not only increases a workers picking speed, but with less fatigue, pick accuracy will also improve.

In general, picking an item from the Golden Zone takes 15 to 40% less time than picking from other tiers of bin shelving or flow rack.

Keep in mind, the Golden Zone can be a different range for different people. When planning Golden Zone picking also consider a 6 feet tall operator will have a different Golden Zone from that of someone 5 feet tall. If you setup a Golden Zone for the 6 feet tall operator, you may make it more difficult for the 5 feet person to pick. Like most other things there are trade-offs. You need to understand the height profile of your operators to effectively determine and implement a Golden Zone strategy.

### KNOWLEDGE NUGGET

When planning storage and picking in the warehouse, base the ABC analysis on the number of times the product is ordered vs. the traditional financial value of the items. While ABC value is relevant, the number of times the order is picked (touched) will have a more direct impact on labor productivity.

KNOW YOUR ORDER PROFILE

A basic principle to optimizing warehouse space is evaluating and selecting the most space efficient storage equipment. Using more dense storage equipment is a key factor to reduce space requirements. An analysis of your products inventory levels and cubic order activity should be performed to accurately define the storage requirements in reserve and the forward picking area. With the requirements clearly defined, the right decisions can be made on selecting from the various single-deep to deep-storage equipment options.

In most warehouses, there should be at least two to three different storage types used in the reserve and forward picking areas. If your warehouse has all single-deep pallet racks, then chances are you can utilize your space more effectively with the addition of different storage equipment.

If you get nothing else out of this white paper, I encourage you to understand your order profiles by analyzing 6 to 12 months' worth of order history and develop a lines per order distribution graph similar to this Figure 8 and Table 5.

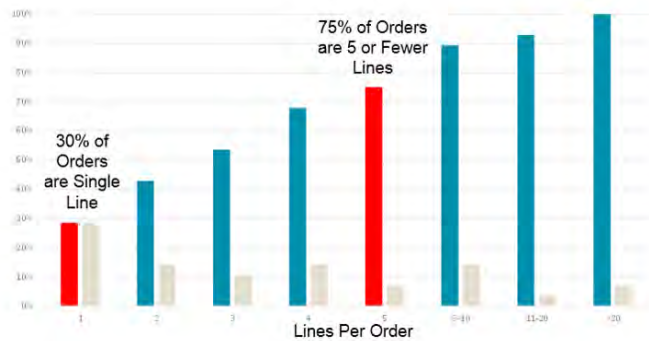


Figure 8

**KNOWLEDGE NUGGET**

Consider Storing the Same Item in Multiple Pick Bins

There is no rule saying an item can only be picked from one bin. Many reasons exist that might support picking inventory from multiple bins. For example, if an item generates enough pick tasks, operator congestion might result if multiple people go to pick from the same bin. Another example is proximity. Think about your home, if you live in a two story house with a basement, would it save you time to store the same type of light bulbs in both the basement and on the second floor versus keeping them in a central bin?

Type	Description	% of Orders
I	Single Line, Single Unit	50%
II	Large Multi-line (100+)	35%
III	Mid-range Multi-unit	15%

Table 5

Once you know your order profiles, you can next perform a cube movement distribution analysis to help assess appropriate storage modes and space requirements.

Cube Movement Analysis

The most revealing analysis for determining storage mode and space allocation decisions is the cube movement distribution.

Cube movement is calculated by multiplying the number of times an item is picked, over a specific time period, times the storage cube of one item (or case). To make the use of cube movement distribution more efficient, it helps to group item cubes into specified ranges.

Figure 9 is an analysis cube movement distribution for a range of orders. In the example, 15 percent of the items ship less than one-tenth of a cubic foot per month. These items may be good candidates for storage drawers or bin shelving. At the other extreme, we see 12 percent of the items move more than 1,000 cubic feet per month, or nearly 20 pallets. These items may be candidates for block stacking, double deep rack, push-back rack, and/or pallet flow lanes.

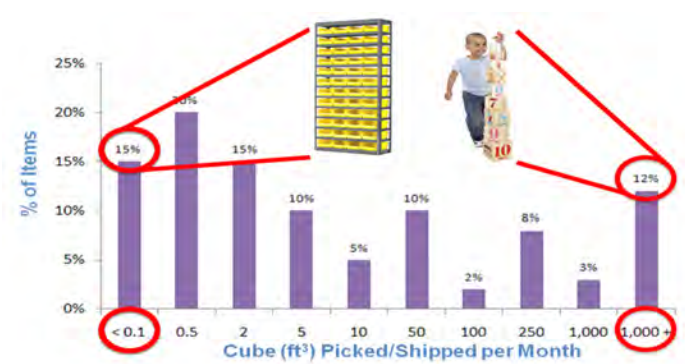


Figure 9

Done properly, cube movement distribution slotting takes into account both cube movement and item popularity. Combined, these distributions can be used to define the types of storage medium to use to balance labor productivity, through-put and space utilization.

For example, items exceeding a certain cube-movement threshold are assigned to carton-flow rack (Figure 10). Items with high cube-movement popularity often need to be re-stocked frequently, and require a larger storage bin as compared to items with medium and low cube-movement which might be assigned to drawers, bin shelving or carousels.

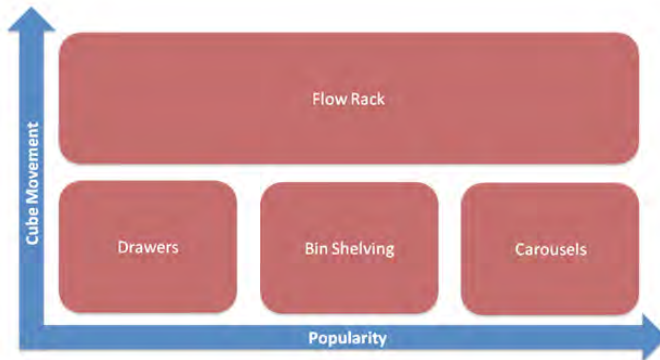


Figure 10

Placing slow-moving, low-cube items in bin shelving and fast-moving items in carton/pallet flow — or other appropriate storage options — improves storage density and picker productivity.

## WAREHOUSE WITHIN A WAREHOUSE



Figure 11

A concept closely aligned with cube movement distribution is Forward Pick and Reserve Storage (Figure 11). Using a Forward Pick strategy helps keep a smaller volume of inventory in easily accessible bins (Forward Pick) with the excess stock in remote bins (Reserve Storage). The Forward Pick zone in a warehouse functions as a "warehouse within a warehouse": many of the most popular SKUs are stored there in small amounts, typically measured in "days" on hand, so order picking can be concentrated within a relatively small area. This reduces unproductive travel by order pickers and enables closer supervision. The trade-off is the Forward Pick zone must be replenished from a bulk storage or reserve storage zone elsewhere in the warehouse where inventory levels are measured in "weeks" or "months" on hand. A typical Forward

Pick zone for small parts is an aisle (or more) of carton flow rack(s) easily replenished. Because it is relatively inexpensive to pick from a Forward Pick zone, the space is particularly valuable. During the planning horizon Forward Pick bins are dedicated, with each SKU allocated a carefully determined volume. When creating a Forward Pick zone consider this space may become congested with picking operators as more picks are centered in this space. You might counter this effect by putting the highest moving SKUs in multiple bins within the zone.

With a Forward Pick strategy, proper replenishment placement and timing is critical to the efficiency of the strategy. The product must be located in the Forward Pick bin when an operator reaches the pick face. Waiting for restocks causes unwanted downtime or incorrect order fulfillment. However the replenishment process can be rather time consuming. It needs to be properly managed to balance picking efficiency gains and the additional replenishment labor.

## Replenishment

A productivity drain in the warehouse results when an operator goes to a bin to perform a pick and there is not enough product in the bin to complete the task.

Pre-posting, the process of validating inventory, is available in the pick bin and in the required quantity before the operator is dispatched to pick the order. If, there is not enough inventory, a replenishment needs to be made to the bin. This helps avoid the wasted trip of going to an empty or short bin for a pick.

Studies have shown it takes up to four times as long to pick inventory that is not in a bin than it does to pick available inventory. Think about it. When an operator goes to a bin for a pick and there is not enough inventory, what happens?

1. First they look at the screen a couple times to recheck and make sure that they are in the right place and are looking for the right product.
2. Next they search behind the pallet;
3. Look in the bin to the right, look in the bin to the left;
4. Until they finally give up,
5. And call the supervisor,



And finally move on to the next task. All of this is wasted time. Bottom-line; make sure you have up to date and accurate inventory record accuracy else you cannot have an easily managed replenishment strategy.



### Optimize Pick UOM

When developing your cube movement analysis discussed earlier, you will begin to better understand your order profiles and typical picking units of measure. For example, many HighJump customers sell through multiple channels including e-commerce and to major retailers. These different order types require different picking units of measure. For example e-commerce orders are typically each picks while retail store orders are cases and/or pallet picks. Setting up your warehouse to support these different pick types will improve throughput, reduce pick errors, and improve overall labor productivity.

You may also hear this concept referred to as a “warehouse within a warehouse”.

### CLUSTER PICK WHEN POSSIBLE

A straight forward way to improve pick labor productivity is to eliminate the travel back and forth to the office and the shipping/packaging areas between order picks. One way to accomplish this is to have one operator pick multiple orders at the same time, or Cluster Pick, if possible. Cluster Picking is a pick method where an operator picks to cartons/totes for multiple orders during one pick tour. Cluster Picking is especially successful when the same item or items are frequently included in multiple orders AND the total cube of multiple orders can be easily handled. For example, if your orders typically result in pallet loads, the benefits of moving and managing multiple pallets will be negligible, but possible. If however, your orders typically fit into a small standard carton size, handling 4 to 6 cartons during the pick tour is quite possible.

Cluster Picking can significantly reduce pick labor requirements but may require additional administrative management if not support by an automated picking system.

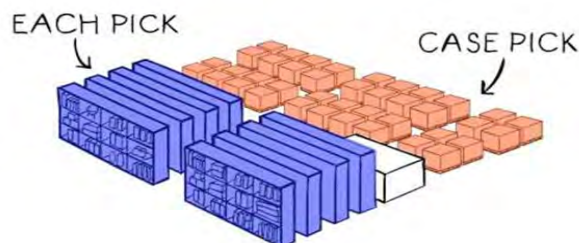


Figure 12

### KNOWLEDGE NUGGET

#### DESIGNATE ONLY A FEW STANDARD SHIPPING CARTONS.

With only a few boxes to choose from — plus a few custom sizes if necessary — pickers will put orders together faster. Standardizing on carton sizes optimizes freight expenses and reduces corrugated spend. It also makes it easier to support a cluster pick workflow. This will increase picking efficiencies, improve storage utilization, and reduce procurement costs.

When designing a cluster pick process, consideration needs to be given to the tradeoffs between reduced travel time and excess handling requirements. At some point there will be diminishing marginal return on cluster size.



Figure 13

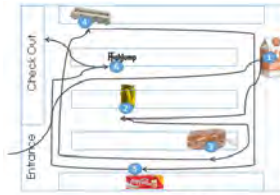
### Pre-routing

Pre-routing is the process of mapping out the pick travel path to reduce wasted motion and travel during the pick. The sequence of items on a standard customer order may not reflect the bin of the material in the warehouse. Consequently, using a standard customer order as the picking document usually results in an inefficient picking process. The ratio of time spent traveling to time spent actually picking material is extremely high because there is no logical sequence to the pick route. An excess amount of backtracking might be required to pick an item that was already passed in the process if the items are stored randomly and there is no pre-routed sequence logic applied to the pick tour.

To demonstrate the benefits of pre-routing an order, let's use an example of a grocery shopping list. You might have items on the shopping list in random order (milk, pickles, bread, eggs, soda, and HighJump WMS). Sometimes the list is developed based off which item you remembered to add first. There is no rationale. At this point, the list serves the purpose of a memory jogger to remind you what to buy on the next trip to the store.

If you go to the store with the list you originally made, the travel through the store may look something like Figure 14...

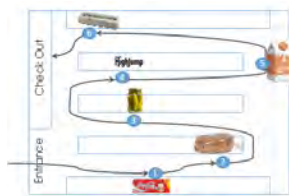
1. Walk in and find the milk;
2. next go to the pickles
3. from there find the bread;
4. eggs are next;
5. Coca Cola for the weekend;
6. gotta have HighJump WMS;
7. and finally proceed to checkout



**Figure 14**

This looks confusing and chaotic. If, however, the order was pre-routed based on bin sequence the travel path might look like Figure 15...

1. Walk in and find the Coca Cola;
2. bread
3. pickles
4. HighJump WMS
5. milk
6. eggs
7. and proceed to checkout



**Figure 15**

You might agree this is much more organized and efficient? And it works well if you want to keep the milk and eggs refrigerated as long as possible.

But can you think of an example why this concept might need some tweaking?

Well, if you are going to buy a lot of soda you might want to get this last to keep from having to move the heavy load around the store. On the other hand, you probably don't want to stack the soda on top of the bread and eggs.

These same principles and considerations apply when planning your warehouse picking strategies.

### STORE PRODUCT PICKED TOGETHER, TOGETHER

When reviewing your ABC profiles and cube movement distribution you should be able to determine if products are frequently ordered together. If you do see a significant correlation, consider storing the product together to help reduce overall travel time per pick tour.

Alternatively, you should be cautious when storing like product together. In most cases you should be confirming the pick by a bin address and/or product bar code scan. However, storing similar products next to each other could cause miss-picks if operators do a visual



pick by product. This could be challenging when pickers are tired and/or rushed. For example, the untrained eye may find it difficult to tell the difference between a two way and three way light switch.

### IMPLEMENT A VENDOR COMPLIANCE PROGRAM

When you consider 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 receiving can be one of the most complicated functions in the warehouse. 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 quickly run into scenarios where product will be sitting on your receiving dock, or on pallets in a corner while your pickers waste time searching for the inventory.

While there are many ways to help streamline the receiving process, I suggest you first attempt to collaborate with your vendors and map out a plan for efficiency and success. 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, the receiving process is slowed. Your profit decreases while the chance of a receiving errors increases. Vendors' shipping decisions/actions can really impact your business.

Consider the following examples:

1. Do your vendors pack multiple items in a single carton?
2. Do they omit packing lists with their shipments?
3. Are items incorrectly packed or marked?
4. Has defective or damaged product ever arrived at your warehouse?
5. Are shipment counts incorrect?
6. Have vendors ever missed delivery dates?

Too many incorrect answers to these questions and you'll find your gross margins shrinking and your profitability drying up.

### LEVEL LOAD

Load leveling has historically been a production planning philosophy in manufacturing. However, the same principles can be applied in the warehouse, the work load is typically driven by order volumes. And order volumes can vary dramatically throughout the day especially if your customers order individually on a random basis, for example, via e-commerce (on-line). In this instance you can either release orders as they are received or batch them over a period of time to later submit to the warehouse for picking. Which strategy you select should incorporate process constraints, bottle necks, and pick labor productivity. Orders are generally managed through customer

service and sent to the warehouse. Once in the warehouse the orders can be held and distributed as needed. If printing pick tickets, the order can be printed then sorted and batched to pickers. Ideally, you will be able to manage the sort and manage orders electronically.

Being able to level load the warehouse will help schedule consistent label and provide reliable customer service (order deliveries).

#### KNOWLEDGE NUGGET

##### CONSIDER VENDOR MANAGED INVENTORY FOR PACKAGING.

Many companies I work with take advantage of a vendor managed inventory (VMI) program for packaging supplies and cartons. Rather than purchasing large volumes of flat cartons and having them consume valuable pallet storage bins, you can provide a carton forecast to your vendor and have them deliver the required quantities weekly or even daily.

#### PASS THE WHITE GLOVE TEST

You can randomly look around for inventory that looks like it may have been around for a while. If the inventory has excess dust on the boxes chances are it has been there too long. Alternatively, if you plan to come back to the warehouse, you can mark one of the cases then when you return (maybe a month or two later) you can easily see if the marked case is still in stock and if it has even moved.

If your facility is squeezed for space, don't overlook the obvious. There are many reasons for keeping excess inventory (customer satisfaction, having complete product lines, lead time uncertainty, etc.), but these reasons should be compared to the cost of storing these items. Housing excess or obsolete inventory results in poor utilization of your space and can be a costly mistake. The first step to removing excess inventory is to calculate the economic amount of inventory you should have on-hand. Then, compare this amount to the actual inventory on-hand. The difference is the amount of potential excess inventory that can be removed. By properly managing your inventory, you can remove excess items and reallocate the space for fast-moving and high-volume products.

The same principle applies to reviewing non-stock inventory. For example, are holiday decorations consuming storage space? Why? What about office supplies? Why are those old computer CRT screens taking up pallet storage bins? And look

at the packing cartons used for shipping? Why are they even there? Can you setup daily deliveries from your carton supplier to free up this space?

Here is another interesting practice I saw at a customer. They are working in a non-automated environment and want more granular tracking of inventory. They decided to use different color shrink wrap to represent different receipt date ranges and easily get an idea, from a quick view of the warehouse, when product was received and more importantly, how long it has been in the warehouse. You can see the different color pallets in the storage racks.



**Example 16**

#### GET INVOLVED

While there are many more low hanging fruit process improvement ideas we could discuss for consideration in your facility, the final item on our list is Get Involved. More specifically, get involved with learning and observing. In today's business environment seldom can anyone afford to live in isolation and not share ideas. Regardless of where you work, there should be many ways for you to get out and see how other people operate. I encourage you to routinely invest time touring other operations and/or attending networking events where you can learn about industry trends and pick up best/neat practices. Following is a brief list of places you can seek for learning opportunities:

- Find a local professional association with regular networking events and tours (i.e. Council of Supply Chain Management, APICS, Lean Atlanta Consortium, etc.) and attend an event.
- Ask one of your suppliers (either product or consumables) if you can tour their operations or if they have other customers interested in reciprocal tours.



- If you are using technology, ask your sales person if they have a customer advisory board you can participate on or other customers interested sharing ideas.
- Ask your neighbor if they are interested in a reciprocal tour. Many warehouses are in industrial parks with other types of warehouses. Call up the one next door and see if they have interest in sharing ideas
- Who do you know? Maybe you know someone who does what you do but for a different company. Chances are you could both benefit from sharing ideas.

## CONCLUSION

Although much attention is placed on techniques for improving the largest warehouse operations using advanced technology, you can generate significant improvements by focusing on the basics for your operation in the warehouse. This effort can reduce costs and improve service without large expenditures. The key is to find appropriate recommendations and changes that fit your type and size of operation. It can be done.

## ABOUT NET AT WORK

We are a full service IT and business consultancy with unparalleled expertise in the development of business technology solutions. We deliver a range of unbiased, integrated solutions that brings our clients every competitive advantage possible.

We help you design, select, implement, and scale all aspects of technology, using our comprehensive solutions portfolio. Our goal is to be considered an integral part of your business; utilizing promising new technologies to attribute to your success and maximize your total return on investment.

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