A Handbook for Warehouse Automation

Find out the ROI, Components, Considerations and more for Automatic Systems

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Introduction

What is an Automated Warehouse Really?

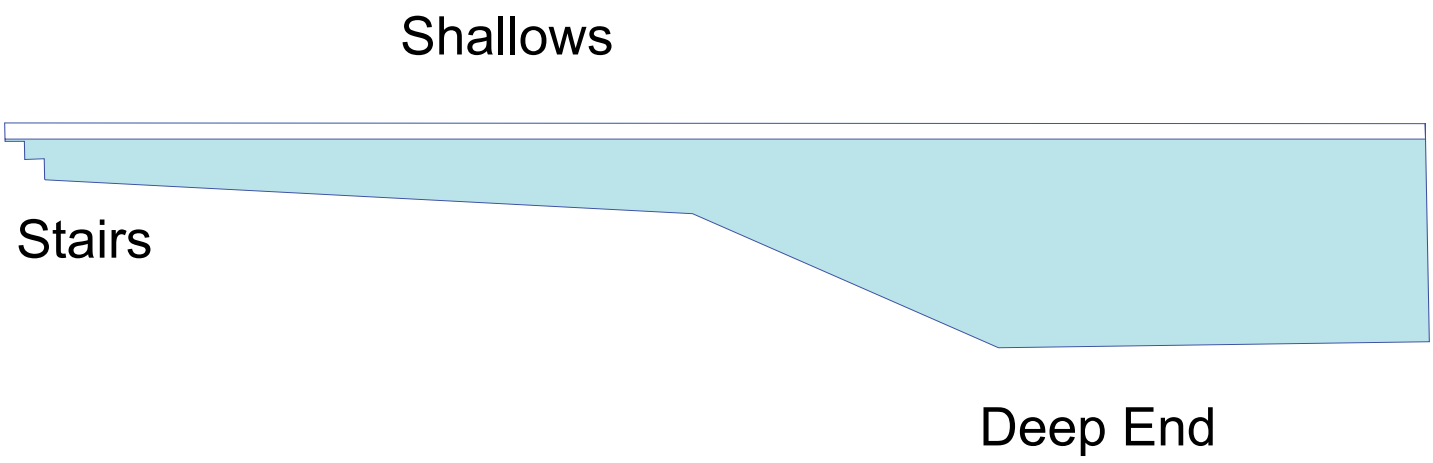
Depends on who you ask....

Warehouse automation can mean a lot of things in the material handling industry. In this guide, we want to clarify how different levels of automation can help your distribution center find efficiencies and give you an ROI. In fact, with automation, your distribution center can be a competitive advantage to your company.

To discuss automation and its different levels in a way that everyone can understand we are going to use an analogy of a swimming pool. If you look at a typical swimming pool, there are usually three distinct areas.

There is the entryway or stairs leading from the deck into the pool. There is the shallow end, and then there is a drop that leads to the deep end or diving area.

Ready? Let's wade in!



CHAPTER ONE

The Stairs

Stairs Synopsis

Company Sales - $20 m or less
Current Technology - Static rack, forklifts, conveyor
New Components - Conveyor and WCS
Considerations - Higher accuracy, still flexible, entry-level investment, possible interruption of operations

Stairs Overview:

This is our entry point into the world of automated warehouses. Most people enter the pool through the stairs. It is the easiest transition from dry land into the pool. It is the traditional way that people come to automation in their DC, as well. Because of growth of other pain points, you need a higher level of automation to meet you and your customer's needs.

This is really the basics of automation. Almost all distribution centers will have some elements of the components we will talk about here. And these are the building blocks for even the most advanced automated distribution centers.

For instance, let's look at one of the basic building blocks of automation.

Stairs Components:

Conveyor: Conveyor: We use conveyor in nearly every level of automation. Whether it is gravity conveyor, powered conveyor, pallet conveyor or overhead conveyor. Almost every automated distribution center will have conveyor.

In fact in our minds, if you have conveyor, you have some sort of automation in your warehouse.

WCS: A WCS or warehouse control system is software that controls your automation in the distribution center. It is the “brain” behind your conveyor and ensures that everything runs as you want it. That’s it with those two components you have a very basic warehouse automation system.

Stairs Pain Points:

When would this system help you?

The reason most business move from no automation into the “entryway” can vary from company to company. However, in most cases, people move to automation because of high errors in their picking which can result in high returns.

If you ship a million products a week at 98% accuracy, that is 20,000 incorrect orders. A week. That’s a lot of returns. The goal of automation is to reduce the error rate to less than .5 percent. Now simple conveyor and a WCS are not going to give you those results necessary, but it is a starting point.

However, this entry level of automation can help with any part of S.A.L.T. Space, accuracy, labor and throughput.

Another driver that we see that encourages businesses to explore automation is local labor shortages or lack of space.

> If you ship a million products a week at 98% accuracy, that is 20,000 incorrect orders. A week.
>
> Chris Youngs

Stairs Candidate Company Snapshot:

Typically a company that is looking at this level of automation is a growing company that has approximately 20 million in sales or less.

A company that is looking to move towards an entry level of automation would have a legacy WCS and static racking. They may have some conveyor and perhaps RF guns and static racks serviced by forklifts.

The focus at a non-automated distribution center is on Person to Goods or P2G, which is different from automation's Goods to Person or G2P.

Stairs Investment:

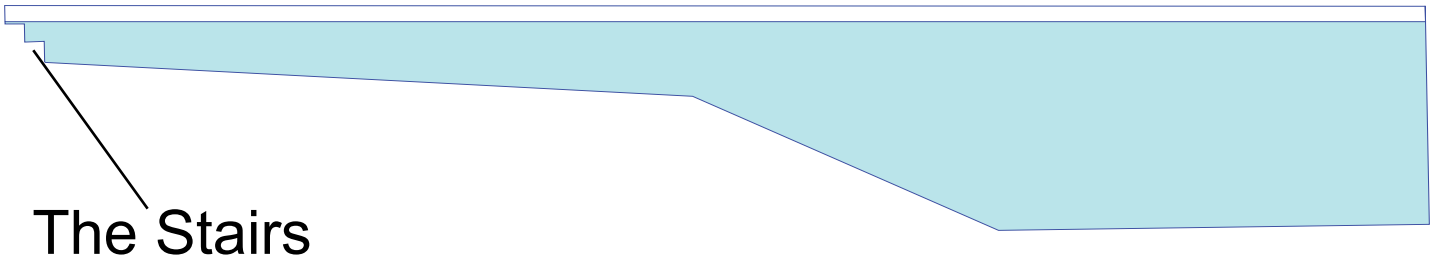
Automation is often seen as very capital intensive. However, incorporating entry automation like the above would range from 50,000 to 2 + million depending on size, business needs and goals.

Stairs ROI:

The ROI of automation can be felt in all aspects of the distribution center SALT. For systems like this, we would expect to see ROI of 12-36 months.

Stairs Points of Consideration:

Higher accuracy
Flexible (We can add people for peak times)
Low investment
There is an investment in time and capital
Potential Interruption of operation



CHAPTER TWO

The Shallows

Shallows Synopsis

Company Sales - 100 m+
Current Technology - Static racking, forklifts, more conveyor
Components - Conveyor, WCS, WMS/WES, Sorters, AS/RS, AGX, PTL, PTV
Considerations - Higher accuracy, throughput organizational Insight Change of labor mix, Likely interruption to Ops, Dedicated support needed

Shallows Overview:

Let's go back to our pool analogy and look at the shallows. Almost everyone can have fun in the shallows; you can play pool sports, and it provides an entry into the deep end of the pool.

In our distribution center, the shallows are where we take our stairs building blocks of basic automation (conveyors, WCS, etc.) and start to add specific technologies.

We refer to this level of automation as a hybrid solution. It is a cross between your standard rack/forklift warehouse and full-automation.

Shallows Components:

We will definitely still include conveyor and a WCS, but at this stage of automation, some level of data analysis usually needs to be done to maximize your investment. Different technologies work for various applications, even within the same industry.

WES/WMS: A WES (Warehouse Execution system) or WMS (Warehouse Management System) is a necessity when we move to this level of automation. While not exactly the same they perform some similar functions, and both handle the “higher” functions of the system (inventory control, product movement, etc.) that the WCS doesn’t. The WES/WMS control and communicate between the variety of components that you use in your warehouse and your other software packages.

Sorters: Sorters automatically group like groups of products together in your distribution center. They help move the process for palletizing, packing, shipping from a manual operator to a more efficient automated process.

Robotics: Robotics is a broad term, but in the automated warehouse they are primarily used for the beginning and end of your distribution process. Typically they are the first and/or last piece of automated machinery to touch products when they enter or leave your DC. At this level robotics are generally used to automate the picking, packing, palletizing or de-palletizing of products.

AS/RS: AS/RS (Automated Storage and Retrieval Systems) is a catch-all term for any component of your systems that handle, store and retrieve products without the need for human interaction. These can vary in cost and sophistication depending on your needs.

Remember that when you use an integrator to help you design your automated DC you have more freedom of choice in your components

Terry M. Shaw

AGV’s: Think of AGV’s (Automatic Guided Vehicles) as a forklift controlled not by a person but as an extension of your WMS. AGV”s like many of the above components come in a variety of functions and models. How you use an AGV in an automated environment varies on your goals and needs. They primarily function as a sophisticated way to convey goods throughout your distribution center replacing or supplementing conveyor and/or forklifts in a wide array of combinations.

Pick to Light: Pick to Light or Put to Light use lights to indicate to associates what items are required for individual orders. These are primarily incorporated into an AS/RS system. They significantly increase accuracy and decrease time for orders.

Pick to Voice: Pick to voice allows the WCS to assist associates in order picking. Instead of consulting a sheet of paper or screen the Pick to Voice system tells associates how many of each item to pick and the location of each item. This dramatically increases speed and accuracy from traditional models.

Shallows Pain Points:

What pain points are going to encourage you to explore a hybrid solution? What will make you leave the “stairs” and move towards the “shallows.”

A lot of the components above are going to primarily solve order accuracy, a lack of space, and throughput issues. Moving to a hybrid solution could also be driven by local labor shortages, as well. Depending on your companies needs you would generally have the earlier technologies (WCS, conveyor, RF guns) now adding the WES/WMS layer and incorporate one or more other technologies for your DC.

Once again it takes a thorough data analysis of your individual goals and needs to decide what components to use.

Shallows Candidate Company Snapshot:

What type of company would get the most return from this type of automation? Your industry could be retail, ecom, manufacturing or warehousing. Somewhere that you’re starting to have diminishing returns just throwing labor at your problems.

Typically, a company would have 100+ m in sales and/or 8+% in growth and running at least two shifts in their DC. The current system would involve a lot of Person to Goods, heavy in conveyor and forklifts.

The most significant barrier to transitioning from the stairs to the shallows is not the investment. The ROI is usually there and is generally quick. The two reasons more companies don’t move to this level of automation the fear of change and disruption to operations/processes within the organization.

Shallows Investment:

Naturally incorporating a hybrid automation/traditional distribution center will be more capital intensive than other “stairs” example. However, incorporating an automation system like the above would range from 1 to 15+ million depending on the size of the business and their needs and goals.

Shallows ROI:

The ROI of automation can be felt in all aspects of the distribution center S.A.L.T (Space, accuracy, labor and throughput).

However, with this level of automation, you are primarily looking for returns in space, throughput, accuracy, and labor in that order. For systems like this, we would expect to see ROI of 18-24 months.
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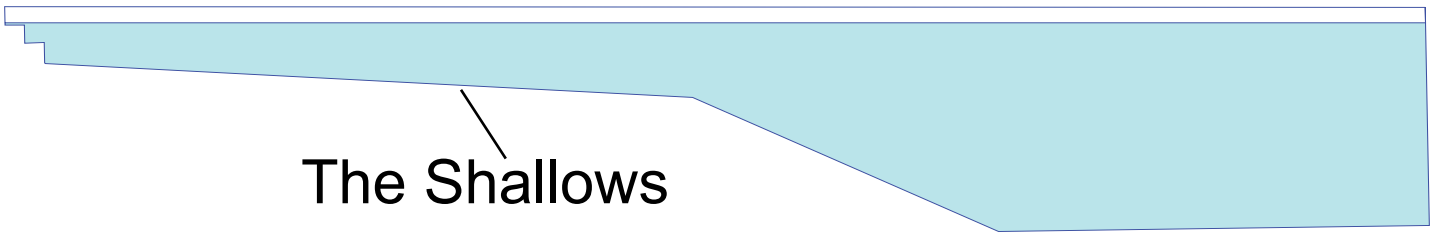
Shallows Points of Consideration:

Higher accuracy
Higher throughput
Reduced labor
Safety/Ergonomics
Allows for higher organizational Insight
Possible interruption to ops
Organizational change
Change of labor mix
Higher maintenance cost
Requires customer dedicated support



CHAPTER THREE

The Deep End

Deep end Synopsis

Company Sales - Company sales 500m+
Current Technology - Conveyor and WCS, maybe a WMS and some modular automation
Components - Rack-supported building, Conveyor, WCS, WMS/WES, Sorters, AS/RS, AGX, PTL, PTV
Considerations - Reduction in labor, Better utilization of floor space, very high accuracy, interruption to ops, Little/ No flexibility after the design is complete, Need flexible land usage/permitting

Deep end Overview

The deep end is the most intense part of the pool but also where you can have the most fun. It is where the diving board lives and where you can really push yourself and your facility. However, the deep end is not for everyone.

This area of automation is where we get the highest return from the system. While “the shallows” forces you to take a look at your data before investing, with this level of automation you must thoroughly understand your operations, processes, and goals. You need to find a partner that will take the time to understand your processes, company philosophies, goals and work with you to properly execute the systems implementation at this level.

Deep end Components

In the “deep end,” we might use all of the components of the “shallows” system, as well as a particular type of building.

Rack-supported building: A rack supported building has no other structural supports other than the rack used for storage. Its design increases the storage capacity however once it is set the interior racking cannot be adjusted. Primarily a rack supported building contains a high-level AS/RS.

Another similarity between the ‘deep end” and a rack supported building is that both may have a lack of light. In fact, a highly-automated rack supported system may be referred to as “lights-out”. Associates only go into the building occasionally so lighting is largely unnecessary.

A rack supported building builds up instead of out, so there is less footprint needed. This can be a significant factor if you are building close to population centers trying to reduce “last-mile” cost or if you already have a land-locked facility you need to expand.

Deep end Pain Points:

Similar to the shallows or hybrid, the deep-end pain points are space, throughput, and labor. Labor concerns become very negligible in the volume of labor. However, the type of labor needed becomes much more specialized.

Accuracy goals can range from 99% to 99.99% so in industries where orders absolutely have to be right the deep end is the place to be.

Deep end Candidate Company Snapshot:

Companies that are considering the “deep end” should have double-digit growth and currently run three shifts in the DC. The industries where high-level of automation would have the most impact could be in retail, ecom, manufacturing, warehousing, grocery, or big box.

Deep end Investment:

The investment in high-level automation is obviously the most capital intensive. A typical range for this investment would be in the $15 - 50+ million.

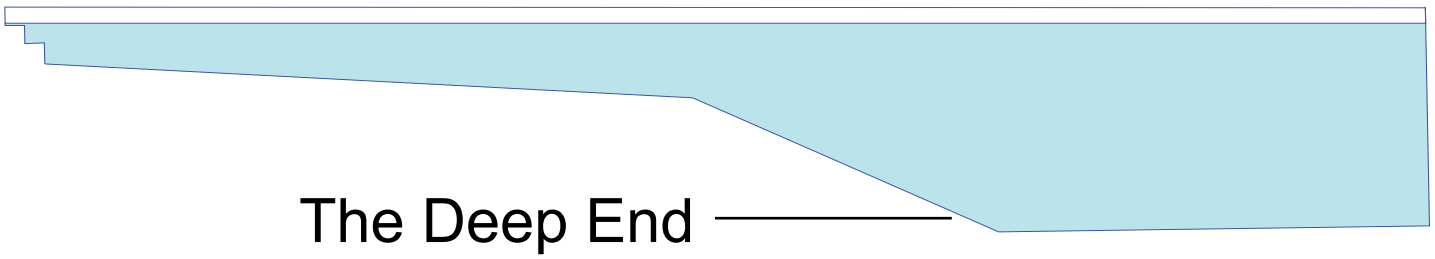
Deep end ROI:

As with the other systems, the impact of the ROI is felt most keenly in accuracy; however, there are significant positive impacts in space, throughput, and labor, as well.

With this type of automation in the deep end in addition to ROI, we can also look at the Internal rate of return or NPV.

Deep end Points of Consideration:

Very high accuracy
Smaller footprint
Change in labor mix
Possible interruption to ops
Little/ No flexibility (can’t throw bodies at the situation)
Need flexible land usage/permitting
Customer dedicated support



CHAPTER FOUR

Conclusion

As we explore the different ways that we can look at automation, one thing becomes clear (as water). Automation can mean a lot of different things to different people. Automation is not a boogieman to frighten you. Companies from a small enterprise to huge multinationals can use automation. Automation is adaptable for different companies and different usages.

It all depends on your company and your goals.

If you would like to learn more about automation and how it might positively impact your company, please reach out to us.

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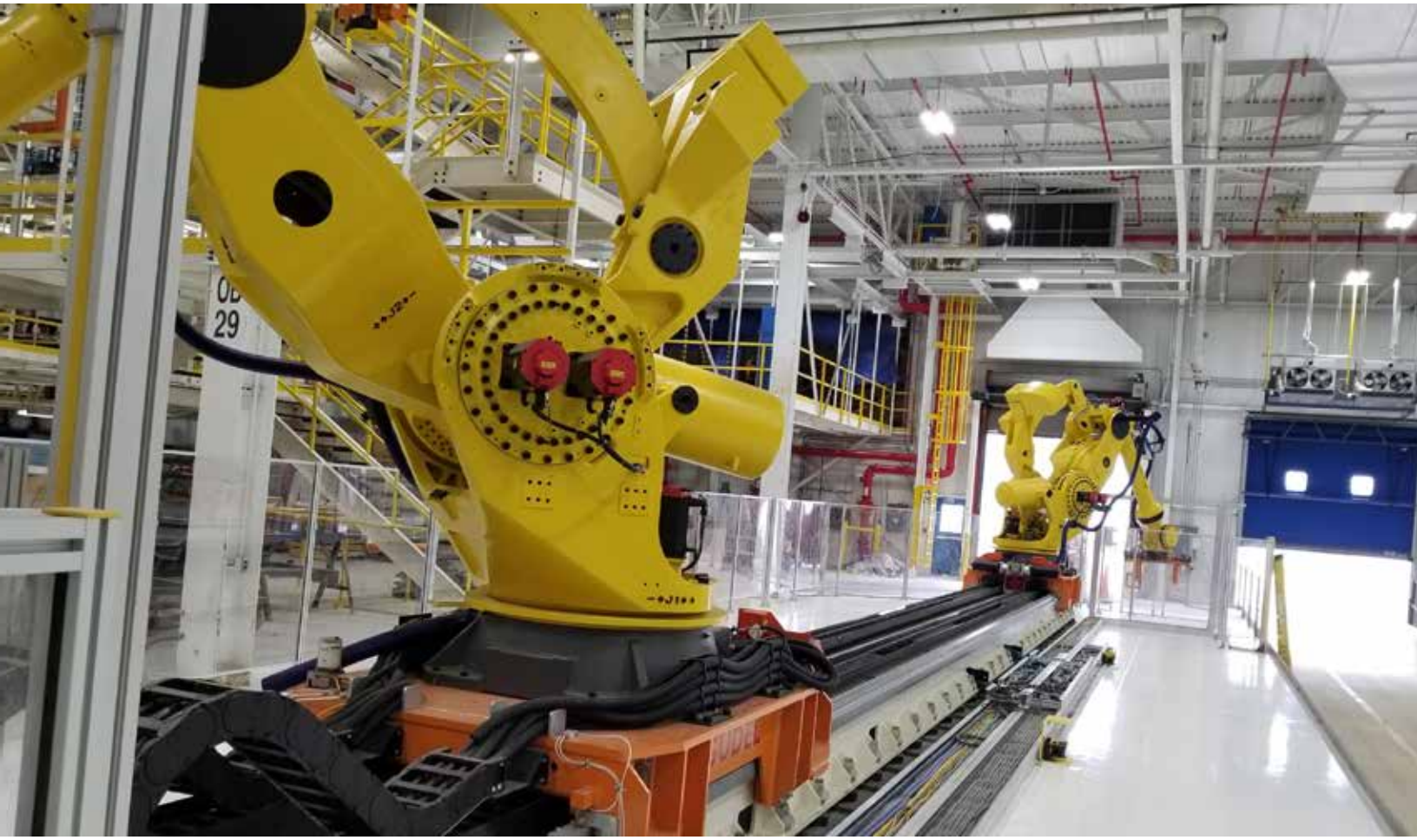

Want to Learn More?

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