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The Ultimate Guide to
Warehouse Automation
Success:

Preparation,
Evaluation and
Implementation

E-BOOK

Introduction

As more supply chains are increasingly driven by technology, many organizations are investigating the benefits of an automated warehouse. Warehouse automation can make your operations far more accurate, productive and responsive, however, it is not a one-size-fits-all proposition. In fact, it's a far cry from a system that you can simply buy, plug in and watch the magic happen. But as the old saying goes, "Nothing worth having comes easy."

If automation is something you are considering for your warehouse, you will need to do some careful research and planning to make sure you're making the right decision. All this hard work will help make the transition to automation as smooth as possible for your business. To get you started on your journey, Tecsys is reviewing the three stages of warehouse automation success: preparation, evaluation and implementation.

[**PREPARATION**]

3-Step Preparation Plan

Feeling the Pressure?

Your company may be facing shortages of reliable warehouse labor and space constraints due to wider varieties of products being requested in smaller amounts and in more frequent orders. Then your customers most likely want the fastest shipping possible. Adding to these burdens is the stress of increasing costs and frustration of order and data inaccuracies.

Warehouse automation can reduce these pressures and help you enhance existing processes by improving efficiency, speed, reliability and accuracy. To prepare for warehouse automation success, follow these three steps to help you get started on the right foot.

1.

Get Your Warehouse Data Right

In real estate, the three most important factors when buying a home are location, location and location. In supply chain, the three most important factors when automating a warehouse are data, data and data. Your warehouse requires reliable data that can be available anytime, anywhere to those who need to make better decisions. Automating without having your data in order is a step toward project failure.

Here are the specific data areas you need to focus on:

Products

Get accurate information about the sizes, weights, handling characteristics, environmental considerations and time-based restrictions that influence how products need to be moved and stored. When new types of products enter the warehouse, you should already have this data in hand to avoid delays. Successful warehouse automation starts with highly reliable core master data about products and a strong integration between your ERP-like system and your warehouse management system (WMS). If you are a 3PL, you have less control over this data, but you should make contracts require it. A few "surprises" of non-standard or unexpected product types hurt automation productivity. Include consumables and maintenance, repair or operations materials to avoid significant, poorly tracked delays for the goods required for the upkeep of the facility.

Locations

You need to know every location in your warehouse in terms of size and weight capacities, plus restrictions about what can or can't be placed within them. This includes every place that products might be kept, such as dock areas, staging areas and overflow floor locations. Take into consideration processing stations where assembly, packaging or value-added activities take place. You'll also need to know the locations for in-transit resources such as carts, forklifts, pickers, conveyors and bots.

Resources

Every person and each piece of equipment has a location, status, capabilities, limitations and capacities that can be allocated and reallocated as needed to adjust to demands. Make sure you have a deep understanding of these resources to greatly reduce the time and effort of accurately and realistically responding to customer needs.

Transactions

Every physical change in product, location and resource status requires a data transaction that tells you what items did what, when and where. An accurate recording of transactions is the lifeblood of successful warehouse automation. Modern data analytics and application of machine learning aren't possible without accurate and timely transactional data to spot patterns, flag problems and opportunities, plus provide situational awareness and options to well-trained industry professionals.

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2.

Understand Your Needs

Good automation preparation shines a light on what products are handled more often and which ones may be candidates to eliminate. Product variety and volume numbers as part of an ABC analysis are fundamental. You absolutely must develop detailed order and item profiles for your project. Average percentages over time can be misleading, so also look at how variable (growth/decline rates, peaks and valleys, seasonality, etc.) each of those products can be.

Additionally, everyone from warehouse pickers to C-level executives should understand what delights (and frustrates) the customer. Gather and analyze reliable data about order patterns and eventual customer satisfaction. Segment and perform discovery analysis to determine where the most issues arise and what kinds of conditions lead to customer satisfaction and dissatisfaction. Know what customers cost you and what you are charging. This is where product, location, resource and transaction data become valuable. You can analyze incoming product and data flows from your suppliers to determine where you are satisfied/dissatisfied and under what kinds of conditions. Lower total cost of acquisition is typically possible by using highly data-capable suppliers.

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3.

Know Where You Are vs. Where You Want to Be

After you have deep knowledge of your warehouse and customer data, now you are ready to plan for growth. Along the way of collecting all this data, you've likely had many "are you kidding me?!" moments where you found process holes and wasted actions. This necessary step of discovery helps you rightsize your products and your procedures.

Here are three questions you'll want to discuss in the final step of your warehouse automation preparation stage:

What are your project motivations?

Most warehouse automation projects focus on doing more with less. This means more orders, customers, product variety, channels, volume and revenue growth — but in less time with minimal investment in additional resources and space. Automation enables you to be more responsive so you can scale up or scale down your operations. If there are product mixes in very different stages of growth and use, then you may be looking at a variety of projects within a project. Targeting a part of the warehouse for automation within the larger warehouse facility might be the answer rather than a sweeping automation of the whole facility. That's why it's critical for your business to have a firm consensus on what you're trying to achieve so you implement the right solution for your needs.

What do your forecasts look like?

During the preparation stage, make sure you are regularly evaluating forecast accuracy across the supply chain and within facilities to better understand how stable or unstable demand patterns really turn out to be. Segment the data and understand what inaccuracies in forecasts cause the greatest grief, then plan for them. Your warehouse is like a player in a game that must react to the other players' actions and tendencies. You can't be perfect, just less wrong.

Where do you want to be?

How much more needs to flow through your facility? You must have performed steps one and two above to truly determine your current capabilities and customer needs before determining a realistic direction of where you want to be. A thorough self-assessment of future direction and needs is a must for warehouse automation projects. This information will be critical as you move into the evaluation stage for warehouse automation where you will review a wide variety of automation types and investigate possible consulting and integration partners.

Conclusion

The preparation stage of warehouse automation is about obtaining your data and defining the fundamentals of what problem needs to be solved. While each stage is of equal importance and contributes to the overall success of your warehouse automation project, taking your time and putting extra focus in this preparation stage is going to help your business in the end. If you don't, you'll run the risk of wasting time and money by creating a solution that doesn't do what you need it to do.

3-Step Evaluation Plan

Ready to Start Looking?

At this point, you have looked at your warehouse problems and decided automation is the right path forward. You have cleaned up all of the warehouse data, figured out your warehouse needs and have a good milestone around your current position versus where you want to go with automation.

It's now time to evaluate potential automation projects and potential solutions.

1.

Get Your Reasons for Doing Automation Right

The right decision matches the problem with the right options against the right criteria. Look at your range of products and transactions to find the best candidates for warehouse automation. You want to look for things that cause repeatable activity volume, accuracy issues, labor intensity or delays. Rank the candidates and consider individual automation projects, while looking for overlaps and coordination between projects.

Popular Reasons for Warehouse Automation

Accuracy improvements
(apply a price for errors)

Productivity improvements
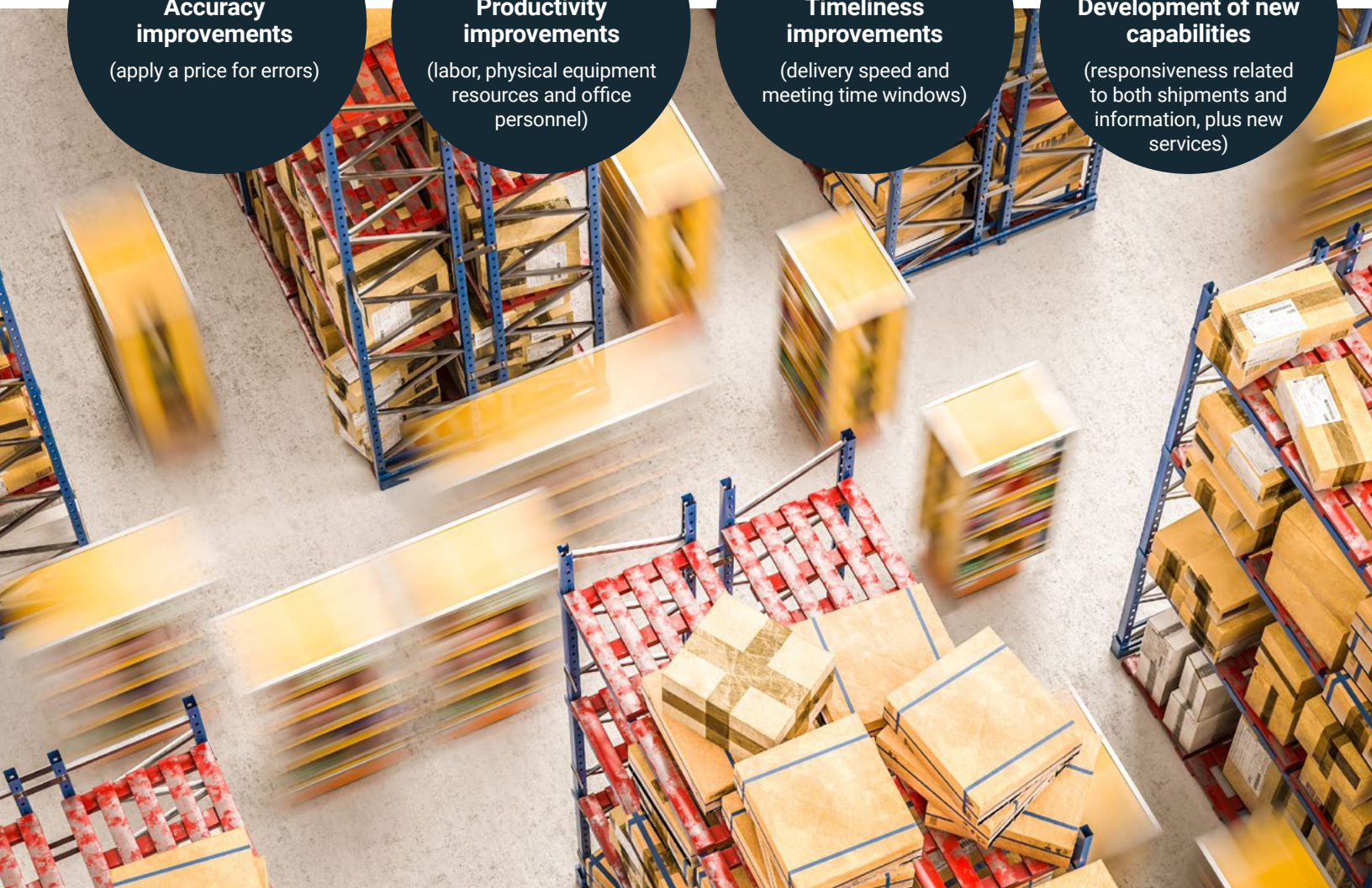(labor, physical equipment resources and office personnel)

Timeliness improvements
(delivery speed and meeting time windows)

Development of new capabilities
(responsiveness related to both shipments and information, plus new services)

Here is a list of some common industry metrics. Your responses to these questions will help you identify your criteria for automation:

Metric	Questions
Perfect Order Percentage	• What percentage of orders are delivered on time, in the right quantities and in the right condition? (includes being undamaged, but also the right labeling, packaging, etc.)
Cycle Time	• How long does it take from receipt of products to being put away and ready to pick? • How long does it take to fill an order? (either shipped or arrival to customer) • What percentage of orders can be shipped within a desired cycle time?
Capacity and Productivity	• How many items or orders can be picked per time period? • How many people or equipment resources are needed? • How much space is required for how much product? • How productive is each person? • Can the system scale up and down easily with demand growth and cycles?
SKU Breadth	• How many SKUs do you have? • How many are productive? • Does the automation system better enable omnichannel or e-commerce capabilities? • Can the automation system work for liquids, semi-solid, bulky, oddly shaped, hazardous, or products requiring temperature-controlled environments?
Financial	• What does it cost to fulfill orders and order lines? (roll up to overall cost of distribution as percentage of sales) • How much does the automation system cost? (total cost of ownership of hardware, software, installation, and ongoing operation) • How much inventory is held and at what cost? How quickly is inventory turning over?

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2.

Find the Automation That Fits Your Problem

Find automation options by asking people you trust in the industry and research trade magazines, blogs and analyst reports. Don't focus on the hardware and software right away, but instead focus on searching for options that are satisfying the criteria that you have identified as being essential.

You might be surprised by the many different warehouse automation options available. To make it even more confusing, there are different levels of cost, complexity and benefits. Carefully evaluate your own level of warehouse automation maturity. Manually operated warehouses extensively using paper-based systems will view some seemingly basic levels of automation, like handheld barcode readers and wireless communication systems tied into a warehouse management system as a huge step. More mature warehouses, having already taken those steps, will be evaluating automated storage and retrieval systems, autonomous vehicles and high-volume sortation systems.

Some factors to consider when selecting your automation selection criteria are:

Greater Identification and Inventory Accuracy

Automation fails without fast, reliable data with timely communication, processing and storage. Tools such as warehouse management systems will make accessing this data easier for you and enable better decision-making about reallocating resources.

At the lower end are handheld barcode scanners with wireless communication capabilities, dependably capturing every identification of products, people, places, orders, tasks, etc. Barcodes still rule the warehouse automation world for the balance of speed, accuracy, cost, and use by your supply chain suppliers and customers. RFID has many valuable applications and should be investigated, but not as a replacement for barcodes. Automated, high-speed vision scanning systems can quickly scan fast-moving cases, trays and individual items from almost any angle and side as they move down conveyors, making them a must for high-volume operations.

For higher-speed picking situations of individual items and small cases, establish a picking solution. Pick or put light systems typically display lights at a pick or put location along with a number, waiting for an operator button press, confirming the pick or put. Mistakes are greatly reduced and transaction information is instantly available.

Fast, reliable data

Timely communication

Processing

Storage

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Better Use of Space

If you only stack pallets on the warehouse floor, storage racks and high-reach forklift capabilities seem like a technological advancement. For the company that already has storage racks to the ceiling, there are ways of squeezing aisles together, using narrow-aisle person-operated lift systems barely more than a pallet wide. There are more automated systems such as ASRS cranes that can put/pick within the entire aisle, plus there are pallet shuttles that can be deployed at each level and can even move from aisle to aisle to match demand levels.

Large amounts of shelves with workers walking around and pulling items off the shelves should be replaced by more compact automated storage and retrieval systems that utilize vertical space to store and retrieve a large amount of SKUs, resulting in gains in space savings and picking time. Closely tracked and controlled items tend to be more secure.

Today, highly scalable systems have small armies of automated devices moving within three-dimensional storage areas, putting away and retrieving items, then possibly even moving to another aisle when order activity is heavier in those areas. These systems replace human pickers riding on picking devices. Look at high-density shuttle systems and systems like AutoStore (taking storage density to a very high level for typically smaller-sized products).

Better Use of Humans

Labor is harder to find and getting more expensive. Pick more and walk less. Many systems bring items to people to perform the intricate handling, packing and other tasks machines can't do reliably or affordably. Also, scan data rather than having people perform slow and error-prone data entry.

Automated pallet stretch-wrapping devices are a form of automation reducing human work and makes the process more consistent. Automatic box erectors and sealers, plus print and apply systems for barcode labels on boxes and products are far more accurate, faster and consistent.

Rise of Mobile Bots

Automated vehicles move products around facilities in a flexible, scalable fashion, further reducing labor demand. They automatically pick items up at docks, taking them to putaway stations, providing replenishment moves, and moving items to shipping docks. They don't get tired or lose focus, but always follow the rules and can work three shifts. Note that conveyors still have a great carrying cost ratio.

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3.

Make Your Automation System Selection

Now that you have the right reasons and the range of automation options to solve your problems, it is time to prioritize and make a selection. First, consider a few of these guiding thoughts.

Don't Be Bleeding Edge

You may wish to be on the leading edge when it comes to warehouse automation, but you also don't want to be on the bleeding edge. Instead, put greater weight on proven options and clearly define risk tolerance for your business.

Decide to Build or Partner

If your company is self-integrating, you will be evaluating individual and collections of hardware and software solutions. Or your company may decide to utilize outside counsel for automation system selection, in which case your team will primarily be evaluating overall satisfaction with the solution and your confidence in their ability to deliver. Either way, the decision-making process is quite similar. When evaluating consultants and integrators, put greater value on those who work with a wider variety of solution providers and tend to package the best solution rather than being dedicated to particular equipment suppliers.

Return to the ABCs

Before making your selection, make sure to turn to your ABC analysis completed in the preparation stage. Your products should be classified as A-type "fast movers," C-type "slow movers" and B-type products are between those two. This is important to reference because each of these types will typically use very different types of handling and storage automation along with different physical locations in the warehouse.

A-type products need to be quickly put away in easy-access pick locations to enable fast response along the main flow lines of the warehouse. They need fast picking, but even faster moving, higher-volume transportation, such as automated sortation conveyors.

B-type items also need relatively fast response, but are put in denser automated storage systems away from the main-line flow of the warehouse. B-types have lower volume transportation needs, requiring just enough to enter the main-line flow to packing and shipping.

C-type items spend much more time in storage and are accessed fewer times overall, but make up a large amount of physical inventory. These products should be stored and accessed in denser automated storage/retrieval type systems. Like the B-types, the C-types need just enough transportation to join the main pack and ship area to complete customer orders. Lower volume and speed conveyors or automated bots can get them where they need to go.

Regardless of ABC classification, some product types are bulky, odd-shaped, highly controlled, hazardous, or have other handling characteristics that don't blend well with handling other products within main flow areas. This means that you may choose more dedicated automated handling bots or keep manually handling them if the volume of movement doesn't support automation.

A put away in easy-access pick locations to enable fast response

B put away from the main-line flow of the warehouse

C make up a large amount of physical inventory

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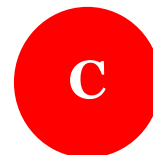
Utilize a Scoring System

Consider using a five- or ten-point scale — the kind utilized in customer satisfaction surveys with a "greatly dissatisfied" to "greatly satisfied" option — because it makes the team evaluation process easier and more reliable. Make the scoring process initially anonymous, then have an open discussion of the top candidates to reach a final decision rather than just selecting top scores.

Eat Only as Much as You Can Hold

There is a temptation to go big with warehouse automation, but putting too much on your team's plate runs the risk of significant heartburn. Concentrate first on information gathering, flow and analysis along with a few areas of hardware automation that have the best balance of investment, return and risk. Start automation with only a portion of the products in order to demonstrate that you can absorb the changes. Then your appetite grows with the successes and your team can take larger bites.

Conclusion

At this point in your automation journey, you should be armed with a strong understanding of your unique business requirements and feel confident in selecting a system that is the best fit for your organization. Conduct your due diligence before confirming your final decision. Talk with references and make sure you are getting a consistent view of their experiences – it speaks volumes about what you can expect.

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3-Step Implementation Plan

Ready to Implement?

You have looked at your warehouse problems and decided automation is the right path forward. Then you have evaluated potential automation projects, potential solutions and selected one. Now you are ready to start the implementation of the project.

For this final phase of your warehouse automation project, follow these three steps to help ensure you successfully reach the finish line.

1.

Communicate the Plan and Train Your Staff

Hardware and software installations are straightforward. Most failures lie in the misunderstandings of the processes and people involved in operating the warehouse before, during and after implementation. Yes, there is a project plan for the physical installation that vendors and in-house personnel will share. Often overlooked, however, is the value of sharing plans regarding how the transition will take place, how procedures will change and what training is needed. It is a worthwhile investment to take the time to build capability and confidence across your warehouse personnel (both on-floor and off-floor).

You will need to identify training gaps for the front-line workers and their supervisors. The advantages of new hardware and procedures adoption must be clearly shown to people at every level. Start at the top with corporate and warehouse general management messaging that blesses the efforts of the warehouse automation project team. The team can then provide suggested talking points that every director shares with their managers, who then share with their front-line supervisors and who finally share with front-line workers. One size of plan does not fit all types of employees. Tailor the training to the level as well and make it as visual as possible. If everyone understands why the warehouse automation is being done and how their jobs are changing, the implementation will be more successful. Train, check and retrain as necessary for greater success.

It is equally important to communicate with your customers, suppliers and partners. Customers don't want to see any changes other than benefits such as greater accuracy, shorter available time windows and higher levels of responsiveness. Nonetheless, they need to be aware and involved in plans for anticipating the go-live date and any contingency plans for when things inevitably go wrong. The same goes for suppliers and partners. So here are a few questions you'll want to have answers to before you start your implementation:

Build a buffer	**Data exchanges**	**Process changes**	**Go-to person**
Can your suppliers and partners build a buffer prior to go-live?	Are your suppliers' and partners' systems prepared for the data exchanges?	Are your suppliers and partners involved in how process changes will affect ordering, receiving/shipping, reporting and financial transactions?	Can your suppliers and partners have a go-to person ready as the primary contact when any adjustments might be necessary?

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2.

Install in Phases and Have Backup Plans

The big reveal! While flipping the switch on everything at once as a go-live might be a dramatic and exciting strategy, you are likely to have more success if your warehouse automation project team breaks the installation into parts.

Here are recommendations for your installation:

Constant Communication and Status Checking

Constant communication between the warehouse automation project team and developers is vital. There should be many small steps with meetings and signoffs at each stage to reduce surprises and motivate everyone to keep continuous focus on the project.

Begin off the Warehouse Floor

Look at what pieces can be implemented off-floor first, transparent to all the warehouse workers. Behind-the-scenes IT infrastructure changes can be staged to prepare the systems to handle all the significantly higher transactions and data flows. Get customer, supplier and partner systems ready as well. Test out transactions and prove the value to all parties. Workers on the floor will lose confidence if office systems fail to provide the kind of responsiveness expected.

Simulate and Pre-test

Run simulations that show the flow of orders and products as they move through the system, checking whether any resources are exceeded or stretched too far. Plan to stay under theoretical capacities because the bottlenecks in the system will make everything less productive. If you don't have the expertise in-house, then contract with a third party that can evaluate the solution — whether it was designed in-house or by a consultant/integrator.

Prepare for Disruption

Have contingency plans for any temporary failures and disruptions if the hardware or software systems might not be working as originally envisioned. Have people that are dedicated (likely includes vendors and integrators) available during the turn-on and times when peak volumes might strain the system. Have plans for rapidly responding to the most critical disruptions.

Celebrate Easy Wins Early

For the first implementation, start in just one highly visible area that has the most likelihood of success and is relatively quick to implement. Celebrate successes to develop a greater level of confidence as more complicated parts of the project plan are implemented.

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3.

Measure, Track and Improve

By the time you finish your typical one- to three-year project and your one- to three-month implementation timeframe, you can breathe a heavy sigh of relief. However, the warehouse automation project team isn't done yet. The project plan should include multiple post-implementation reviews to check the KPIs, variances, feedback from customers/suppliers/partners and true costs. Once you've collected this data you can start to analyze what didn't go according to plan and what can be improved. With this information you can determine if there are any new capabilities or benefits that were not anticipated.

The team will find that products and order patterns may have changed significantly since the beginning of the project. It may be months or years between projects, so document what was planned and learned for the next time. You will want to know what pieces were not included in this round of automation so it can be reviewed by the next project team.

Post-implementation reviews

Check the KPIs and variances

Feedback from customers/ suppliers/partners

True costs

Conclusion

When warehouse automation is done right, teams have less of a "thank goodness it's over, get me out of here" attitude. At Tecsys, we have seen organizations take more of a "that was fantastic, we've learned so much, what's next" approach to a project. A less appreciated aspect of warehouse automation is that on-the-warehouse-floor workers tend to feel a sense of pride that they are working in a more modern, higher-performing facility. There are fewer errors, less blame, more productivity and a sense of progress. Don't underestimate the value of those feelings on retention and additional gains in productivity and attention to detail. Through a sense of shared responsibility, a warehouse automation project can give your company and staff the opportunity to thrive.

Speak to a supply chain expert →

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About **Tecsys**

Since our founding in 1983, so much has changed in supply chain technology. But one thing has remained consistent across industries, geographies and decades — by transforming their supply chains, good organizations can become great.

Our solutions and services create clarity from operational complexity with end-to-end supply chain visibility. Our customers reduce operating costs, improve customer service and uncover optimization opportunities.

We believe that visionary organizations should have the opportunity to thrive. And they should not have to sacrifice their core values and principles as they grow. Our approach to supply chain transformation enables growing organizations to realize their aspirations.

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