

Warehouse Optimization

The Next Step in the Supply Chain



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For years, Warehouse Managers were urged to get control of the operations inside the four walls of their warehouses. That meant moving from paper based manual operations to what was then the next step in warehouse productivity: Real-time wireless data collection systems and supply chain execution software systems like warehouse management software (WMS), transportation management software (TMS), yard management systems (YMS), and small parcel manifest systems.

Current Day

Fast forward to the “Internet Revolution”. With visions of the end-to-end supply chain dancing in their heads, many companies shifted their focus away from optimizing their operations to seamlessly connecting their suppliers and customers.

While the promise of the connected supply chain was alluring, it missed a crucial point: order execution inside the four walls of the warehouse is still where the rubber hits the road. That has brought the focus back to the value gained from an integrated suite of supply chain execution applications including *Radio Frequency* (RF) enabled, wireless data collection devices for real-time visibility inside your warehouse.

But what if your company has already implemented the building blocks of an integrated, real-time order fulfillment solution? How do you get even more productivity from your warehouse and distribution center? That’s where warehouse optimization comes into play.

Warehouse optimization strives to get the most from your overall processes, rather than the individual process steps, by determining the optimal way to execute and ship orders given all constraints. This emerging practice requires you to look beyond the cheapest way to ship or the most efficient way to pick. Instead, optimization determines the most cost-effective way to pick and ship while also meeting customer service requirements. Juggling those three balls at one time is no easy feat. And it is impossible without a real-time wireless data collection network.

Beyond WMS

A distribution center manager or supply chain executive might wonder: Why do I need another system to optimize my warehouse and transportation departments? Weren’t warehouse and transportation management systems supposed to fill that role?

The short answer is yes, and they do. The benefits of implementing WMS, TMS, and real-time data collection systems are proven and quantifiable. But even in an integrated suite of supply chain execution systems like WMS, TMS, yard management, and parcel shipping, the applications don’t look at the constraints that impact order fulfillment. Those constraints include the availability of inventory; the throughput capabilities of automated machinery and lift trucks; the availability and cost of labor; and the cost and

availability of transportation. They also include critical value-added and customer service requirements.

What's more, the systems create individual plans for their area of control. The TMS is concerned about the best way to ship, but not about the impact of the shipping schedule on the warehouse that has to pick and pack the orders. What's missing is a holistic view of all those operations, including the constraints on the facility. Most people can not look at the orders in their system and determine the optimal sequence to release orders to the floor to maximize the total utilization of their resources, and still meet the customer's delivery date.

The best companies have intuitively solved that problem with an extra step before orders are released to the floor. The customers getting the most value out of their systems have a fulfillment expert studying the order waves before they're released to the floor. That person understands the nuances of the facility and has figured out the constraints.

In part, an optimization engine automates the process of releasing orders to the floor that a planner now does manually. There could be two orders for the same truck that are very difficult to pick together. An optimization engine understands that it might be cheaper overall to process them at very different times and put them on different trucks. The transportation cost might be slightly more expensive, but the overall cost to the enterprise is lower.

In other words, optimization may result in spending extra money to ship one order to save an even larger sum for the greater good. In essence, today's WMS and TMS systems are like a group of very talented musicians playing by themselves in practice rooms. Each knows how to play an instrument, but alone in the room none have a connection to the other musicians next door.

An optimization engine, on the other hand, goes beyond WMS and TMS. The engine looks at orders and constraints to decide how to pick and ship each order to meet customer service requirements at the lowest total operational cost. It's like bringing those musicians together in an orchestra. Now, they're playing together, each aware of the part the other is playing.

Today's Execution World

To understand why optimization is potentially so important, it helps to think about the real-world of order fulfillment inside the four walls of the warehouse today. Once, the ability to deliver the right product to the right place at the right time was a differentiator. Now it is a requirement as is the ability to meet complicated customer service and delivery demands.

Order fulfillment today involves more and smaller orders, and an increasing number of value-added services that include:

- Special packaging
- Kitting
- Custom labeling
- Scheduled delivery times

More and more retailers are looking for the edge that comes from special packaging, but it's not just retailers looking for that edge. Industrial customers are also demanding value-added services from their suppliers. Many industrial customers don't deliver a "box" to a distribution center or store. They are delivering a custom-configured solution to an office where the delivery hours, the location, and the removal of the existing equipment is also a factor.

Existing Solutions Fall Short

Market-leading companies have been meeting those new challenges with real-time supply chain execution tools. More forward-thinking customers have implemented WMS, TMS, yard management systems, and small parcel shipping systems to stay ahead of the competition. They must also work with carriers as strategic partners rather than just shopping for the lowest possible cost.

The demands, however, are increasing faster than ever. Automation will only get you so far, an organization will quickly reach another plateau where improvement stops or becomes much harder to achieve. In today's real-time economy, information still moves faster than an enterprise's ability to respond to that information and execute orders, even with existing supply chain execution systems.

Think of it as an execution gap.

Tools are needed to close the gap between information and execution so inventory levels continue to lower and still provide better customer response. Visibility and event management solutions that notify users of important exceptions to their plans, like late shipments or inventory shortages, were developed to make enterprises more responsive. While those are great at tracking orders that have already been shipped, there's not a lot a user can do to reduce costs once inventory leaves your facility.

The demand is knowing where your orders are in the process, but there's only so much you can do to affect the cost to fill an order once it is on the truck. The goal is to provide value-added services and execute more on smaller orders that take place inside the four walls of your distribution center. For the company seeking continual improvement, the warehouse optimization step is one that needs to be taken to close the gap.

The Optimization Solution

The real limitation of traditional supply chain execution tools is this: even an integrated suite of applications executes only in sequence. For instance, if you send a batch of orders to the warehouse, the transportation management system will create an ideal shipping schedule; the yard management system will then create a plan to handle trailers

in the yard; and the warehouse management system will assign lift trucks, equipment, and order pickers to efficiently fill the orders. The lowest cost shipping plan may, however, actually increase the cost of picking those orders.

Optimization, on the other hand, is all about execution based on all the resources that are available. The engine looks at orders that will be filled, and then builds the best plan to get the work done based on the available resources. Think of it as performance-driven execution—calculating the best way to fill orders and optimize the performance of your facility at the same time with the aid of RF-enabled wireless devices and supply chain execution tools.

It Has to be Real-Time

Warehouse optimization isn't possible without timely and accurate information. That's why RF-enabled real time data collection systems are so important. The data you receive from WMS, YMS, TMS, and parcel manifest systems provides the information you need to know whether you are executing against the optimized plan. That is why these solutions sit on a real-time infrastructure.

Inside the four walls of the warehouse, real-time means visibility into your inventory and processes as they happen. That is visibility from the time product is unloaded at the receiving dock until it's loaded onto another truck at the shipping dock and everything in between. In fact, real-time information is essential to any supply chain execution system in today's demanding order fulfillment world, not just optimization. Piece picking, value-added services, direct-to-consumer fulfillment, and building store-ready pallets of mixed merchandise would be impractical without accurate, real-time information about the location of product in the facility, as many users have discovered.

Human error isn't the only reason manual systems produce errors. Customer service departments and web sites need up to the minute inventory information before they can promise delivery dates. That's not possible when information is batched at the end of a shift. What's more, best practices like crossdocking and flow-through warehousing that require the synchronization of processes throughout the facility would be significantly more complicated without up to the minute information. When it comes to optimizing the warehouse, real-time systems provide not only visibility into the location and amount of inventory, they also track the status of order picking processes and the location of order pickers inside the facility.

The result is real-time distribution efficiencies—optimization—by minimizing the amount of time that personnel spend between assignments. Not only has the use of real-time information collection technology expanded; the technology is more powerful than ever. Today's devices are not just dumb terminals receiving instructions over a wireless network. They have evolved into true computing devices that allow a lift truck driver, an order picker, or a warehouse manager to take the WMS system with them to the point on the floor where the work will be performed.

Performance Driven

Advancements in real-time technology are also facilitating the performance-driven warehouse. In fact, the transformation of RF technology from mobile data collection devices into smart, mobile computing devices is really analogous to warehouse optimization: transforming WMS into a new, more powerful tool.

Companies that have not yet implemented a real time data network, WMS, and TMS, must do so first. However, if the building blocks are in place, optimization systems can take advantage of the foundational work implemented by the best enterprises. There's still an opportunity to save a lot of money within the four walls of the warehouse.

How Optimization Works

An optimization engine is a component of a supply chain execution suite, one of the applications that make things happen. By itself, however, it doesn't manage the activities in the warehouse, yard, or transportation department. And while it has visibility into inventory and order fulfillment activities, it's not a supply chain visibility and event management solution either.

Rather, an optimization application is a layer of software that sits atop and communicates with all the other supply chain execution solutions, including warehouse, transportation, small parcel manifest, and yard management systems. That gives the optimization application a bird's eye view of activities. When orders come into the system, the optimization engine compares the orders against the operational limitations in all the relevant departments.

Those constraints may be one of many:

- Available inventory
- Expected delivery dates of anticipated inventory
- Trailers already in the yard
- Desired staffing levels
- Value added services
- Customer service requirements
- Availability and cost of transportation

The current status of those constraints is gathered by real time data collection systems; processed by the WMS, TMS, YMS, and parcel shipping system; and then fed to the optimization engine.

With that information, the system determines the best sequence to get those orders out the door within the time period. A request could be asked of the system to run a plan for tomorrow's shift or for the next two days. Regardless of the time frame, it's all about executing orders. While the steps are complicated, the point of that plan is quite simple: what should I do next to optimize all my operations?

Given the constraints, it will also identify those orders that will miss the desired delivery date. The user now has the option of calling customers to rearrange delivery schedules, or

of tweaking the plan with new constraints, like working over-time today, bringing extra temporary help tomorrow, or paying extra to expedite some shipments.

Once the plan has been tweaked, it's passed on to the WMS, TMS, parcel manifest system, and YMS to execute. Of course, warehouse operations are dynamic. Once execution begins, unexpected orders may come into the system; other orders may have to be expedited or delayed; or a truckload of inventory may not arrive on schedule. Those changes can be fed back to the optimization engine to determine their impact on the current picking and shipping operations, and whether any new actions need to be taken.