



# Planning, Designing & Implementing Distribution Center Improvements

How to successfully complete the process of developing a retrofit/expansion or new facility project that is aligned with your supply chain goals. | [www.FORTE-Industries.com](http://www.FORTE-Industries.com)


## NEW OR IMPROVED DISTRIBUTION CENTERS: AN INTRODUCTION TO THE PROCESS


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As part of the team responsible for your organization's distribution supply chain activities with at-capacity or over-capacity distribution centers (DCs), how do you know what changes should be made? Should you retrofit and/or expand your current facility, or should you make a move to a new location, either leased or Greenfield?

Maybe the current situation snuck up on you? After all, it's not like there's a reliable crystal ball out there to help predict future growth. And although having more business than you can effectively handle is a good problem to have, it is, nonetheless, a problem that needs to be addressed and preferably sooner rather than later.

How to handle current and future growth can often best be determined through a comprehensive supply chain network optimization process. When looking specifically at the facilities in your supply chain as an element of that process, look for any of the following three capacity problems as a trigger for seeking a better solution:

 **Reserve Storage** runs close to or at capacity on a continual basis, as opposed to seasonal overflow. Or, perhaps you've been forced to adopt outside storage methods to handle the excess, either in another facility or in trailers on your lot. The best designed facility allows for normal operations to require only 85% of reserve storage space, permitting easier accessibility of products for put-away and replenishment and capacity for peak periods.

 **Pick locations** no longer effectively support your active stock keeping units (SKUs). Whether handling full or split cases manually or through a highly-automated system, if you don't have enough pick locations to handle the volume demands of your customers, or if you can't replenish those pick locations fast enough, a change needs to be made.

 **Additional personnel** or additional shifts cannot handle demands. Many facilities can generate additional capacity for both picking and replenishment by adding a second or third shift. However, when that solution reaches critical mass—for example, business is growing by 30% a year but in order to handle it a 35% increase

in staffing is needed, or if picking can only be done during the first two shifts because the third shift is dedicated to replenishment—a new approach is needed.

Arriving at that better solution requires a thorough understanding of your current situation, as well as of your company's goals for future growth. With these parameters in mind, you can then work toward your ideal improved distribution center, whether in the form of a retrofit/expansion of the current facility, or building a new facility from scratch.



Here we take a look at how to examine both short- and long-term operations goals to frame your ideal solution, as well as the planning, design and implementation phases that will yield the most efficient DC in the present that will remain flexible for the future.

## RETROFIT OR BUILD NEW: BALANCING SHORT AND LONG-TERM OBJECTIVES

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Certainly most companies would like to extract the maximum useable value from a current facility. Some are reluctant to sign off on construction of a new building because of perceived time and expense. Nevertheless, the most important consideration is **how long can the current DC support projected growth?**

Sometimes an existing warehouse can be retrofitted and/or expanded to adapt to current and forecasted demands. To determine if this is the right approach, several factors should be considered:

-  First, start with an evaluation of the structure and its location, if additional square footage is required. Is the property landlocked? Is there room on the property to permit the building to be expanded in at least one direction? Are load bearing walls, offices or key mechanical junctions in the way?
-  Then, look closely at the current materials handling equipment and system. Was it designed for future expansion? Perhaps more importantly, is the current system oriented in such a way that it can be expanded in the same direction as the physical building? Too often, new facilities and the equipment within are designed as separate projects, with little or no consideration of potential future flexibility.

➤ Finally, consider cost. Sometimes the cost of overcoming such obstacles as described above clearly dwarfs the cost of a new building. Additional financial considerations may include the possible disruption of service to customers, and the reduction in efficiency and throughput that may result from trying to operate out of a DC under construction.

For these reasons, many companies often undertake a retrofit as a short-term solution, making small changes to yield incremental improvements in current operations while a new facility is planned. After all, it would not be feasible to stop serving customers while waiting for a new building to break ground. The installation of a new piece of equipment that could later be relocated to a new facility; the implementation of some new, more efficient handling processes and practices; or layout and organization changes are often enough to yield more economical and accurate distribution performance in the short-term.

While addressing short-term needs with a retrofit, a new, scalable and flexible facility can be planned, designed and implemented to meet long-term operational goals, including optimized operations from receiving to shipping, maximum labor utilization and provisions for future growth.

## THE PLANNING PHASE

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The first step in planning your facility's improvements is to establish key performance indicators (KPIs). These metrics—including estimated productivity by functional area, storage space requirements, facility and equipment capacities and estimated labor costs—form the benchmarks against which the final solution design will be measured.

As always, these KPIs should be directly tied to your organization's overarching supply chain goals in order to attain the ideal optimized network. Then, develop both short-term and long-term solutions via a thorough analysis of operations data. This analysis is key to determining optimal flow of SKUs through a facility, supported by optimal information handling processes. Each functional area is examined, with product and order characteristics evaluated to help establish distribution projections for the future. Additionally, processes and functional areas are examined during this phase to determine if changes—such as pre-labeling or advance shipping notifications from vendors—would yield improved efficiency and faster, more accurate throughput in the short term.

Areas that should be evaluated include receiving, put-away, reserve storage, replenishment, picking, value-added services, shipping and warehouse management systems software (WMS) - with reserve storage and picking generally being the two most critical areas for improvement, and therefore the review to watch closely. Typical data to examine includes:

- ✚ **Item information for each SKU handled.** This includes all item numbers, descriptions, grouping information, special handling needs, length, width, height and weight of one unit and one caseload of each item, as well as pallet load details.
- ✚ **Order history information for the past year and for peak seasons.** This includes order numbers, shipment identification numbers, order and ship dates, customer number, name and ship to location, carrier code and service level.
- ✚ **Order details.** This includes order and line numbers, units of measure, quantity ordered and shipped and carton identifier information.
- ✚ **Location in the warehouse.** This includes internal location identifier, zone, aisle, bay, level and position of each SKU stored, quantities, type of storage location (such as primary pick or reserve station) and type of storage media (such as pallet rack or carousel).
- ✚ **Inbound receipt details.** This includes purchase order and item numbers, number of items ordered, quantity of items received and order and receipt dates.
- ✚ **Customer data.** This includes customer number identifier, name, type and billing and shipping addresses.

Once the data has been collected, it forms the basis for establishing distribution capacity requirements in the short-term, as well as to help determine the types and amount of equipment and space needed for each area of a planned new facility.

To achieve the optimal facility, it's best to first analyze each functional area independently of the others, with the goal of outlining one to four possible approaches to handling in each location. Then each approach is evaluated in terms of design, efficiency and cost. For example, when examining reserve storage solutions, options might include narrow aisle storage, very narrow aisle storage, double deep storage and drive-in rack. Each option should be considered not only in terms of efficiency and affordability, but also on its capacity for future expansion. Rank each according to your KPIs.

Next, it's time to start assembling the process on paper through conceptual facility layout. It may be surprising to note that sometimes the best solution for a functional area may not be the best solution for the overall DC handling system. For example, very narrow aisle storage might be your ideal solution in the reserve storage area because it offers the densest storage in the least amount of square footage. But when applied in a system model utilizing the most ideal picking solution, you may discover that the very narrow aisle storage solution couldn't support the rate of replenishment required to keep up with picking. Looking at the sum of the parts is important to finding the best one to three possible solutions. Other areas to contemplate during the planning process include assessing the potential use of third-party logistics (3PL) providers, possible consolidation of several facilities into one, transition planning, compliance program conformity, network analysis or the potential use of radiofrequency identification (RFID) technologies.

This planning phase of the process, which typically takes anywhere from 12 to 16 weeks, concludes with an evaluation of these two to three potential facility concepts. Items to consider include budget limitations, personnel needs, equipment requirements and how the concepts stack up to the KPIs identified at the beginning of the planning phase.

## THE DESIGN PHASE

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In the design phase, it's time to refine the one to three concepts that resulted from the planning phase of the process. If needed, consult with upper management to expand growth projections. Are acquisitions being considered that might affect the future growth and handling capability of the facility? Does the marketing plan to implement new products or a new e-commerce option open up different fulfillment requirements? It's important to ensure that during the planning process, things haven't changed—or if they have changed, that you select the design concept that best accommodates that change.

Next, it's time to work with the building architect to develop detailed drawings of the facility and the system. Hardware and software system plans are included in the design, along with the physical footprint of the facility. Detailed equipment layouts should be developed. Additionally, future expansion plans—for both systems and facility—should be developed to provide flexibility to accommodate future growth. In fact, some designs are drawn to deliberately show progressive upgrades as future budget years allow. For example, a company might ultimately desire to

automate their sortation system, but can't afford that technology in the initial phase of implementation. The final design, therefore, would be planned in stages, with a manual sortation process developed for the first year, and the implementation of automation technology later when additional capital becomes available.

Working with an architect not only yields a better understanding of the feasibility of each concept, but also the potential cost. A skilled architect can also point out structural modifications necessary to either a retrofit or new facility project that might offer additional convenience or cost savings. For example, in order to expand an existing facility, one option might be to reinforce the ceiling so that equipment can be suspended from above rather than anchored to the floor—which might impede future facility layouts. An architect has the insight to examine the actual cost differences and future value of each option to help narrow the selection for the ultimate design concept.

The design phase also includes a plan for integrating automation systems, process and material handling engineering, meeting compliance program requirements and objective vendor selection. All these elements should take into consideration overall supply chain initiatives as set forth through the network-wide optimization process. In addition, any functional specifications for recommended WMS modules required to manage inventory at the facility as part of the overall strategies should be detailed at this point to aid in vendor selection. This document should detail all the known requirements for both the current and future operations. This helps to avoid costly post integration modifications to either the automation system, WMS or ERP, depending on your situation.

Comparing the relative cost/benefit differences of each concept will ultimately yield the final design. Before jumping in to the implementation phase, be sure to have both a firm fixed price for the final step, as well as a detailed schedule for completion of the project. Finally, a budget detailing both the initial system as designed as well as the expected cost of projected future enhancements and expansions to the system should be developed.

## THE IMPLEMENTATION PHASE

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Now it's time to break ground on either your expanded or new facility. Design phase drawings are expanded into the detailed installation drawings. Equipment is placed on order. The electrical

controls and the system software are engineered. Areas of particular importance to monitor are the seamless integration of the automation systems with a WMS or ERP (or both), again with particular consideration paid to relating that data as a component of the overarching supply chain goals. Finally, the system comes together on site. Extensive testing to an agreed-upon commissioning plan is the final step before go live.


Also critical is training of your new or existing staff. Be sure to provide extensive systems operations and maintenance training for supervisory, operator and maintenance employees. A combination of hands-on and classroom training generally offers the smoothest transition from an old to new system. This reduces confusion during new system ramp-up and generates the quickest, most productive utilization of the new or expanded facility. This training should begin during the installation of equipment and continue through commissioning.

Finally, to ensure maximum return on investment from your expanded or new facility, it's important to continually review the KPIs established at the beginning of the process. By monitoring and reviewing actual results as compared to those baseline standards, it will enable you to isolate trends and react quickly if things get off course. Constant refinement of the process will help your DC keep up with change and growth, ensuring that your improved facility meets your operational goals.

## THREE REAL-WORLD EXAMPLES

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### Writing Instrument Manufacturer Retrofits for 100% Accuracy


 After a three-facility consolidation, a leading manufacturer of writing instruments overtaxed their single-sort, 10-lane sortation system, particularly during seasonal peaks when the average number of cases shipped per day jumped from 30,000 to 60,000. Using temporary labor to help scan and manually sort cases to the pallet locations dropped accuracy from 99% to 95%, resulting in an increase in charge-backs.

Retrofitting the original sortation system with two new sorters serving a total of 100 lanes eliminated RF scanning of the case to the pallet. Now, a bar code label identifying assigned pallet position is applied to each carton. Once scanned, the WMS automatically routes the carton to its appropriate location. The retrofit was

completed in fewer than 120 days in the same footprint of the existing facility while the DC continued operations.

Results include 100% shipping accuracy, increased productivity without the addition of labor and extremely low troubleshooting requirements.


### **Medical Device Manufacturer Consolidates Seven Facilities into One Global DC**

 In order to combine shipping of products from multiple divisions, improve efficiencies and service levels and provide room for growth; a leading multinational developer of medical technologies consolidated seven different distribution centers (DCs) into one FDA-regulated global DC.

After examining multiple conceptual solutions with varying levels of automation and the corresponding budgets for each option, the company selected a design that interfaced with a new WMS that accommodated FDA CFR Part 11 regulations. The new 400,000 square foot DC was completed on time and on budget.

Results include a 29% reduction in labor, even as the DC experienced 10-12% volume growth per year. Labor increases are no longer deemed necessary to manage forecasted growth and picking accuracy is greater than 99%.

### **Faucet Manufacturer's New DC Improves Customer Service**

 In order to increase the warehouse capacity of a residential and commercial faucet company's existing manufacturing facility, three DCs were combined into one. The plan and design of a new 255,000 square foot facility allowed for shortened delivery time to target markets, while supporting forecasted growth with planned future expandability.







Taking into consideration the need to handle split case picks for retail, wholesale and direct-to-customer warranty orders, the design integrated a new WMS capable of automatically routing these products through six pick zones.

Results include increased speed of delivery, with 75% of all major markets reachable within 24 hours, lowered inventory levels across the supply chain and decreased transportation costs.



## WHY FORTE

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-  Single-Source Accountability - Whether we're helping you develop a strategic plan, design and build a distribution facility, or optimize a distribution operation through performance metrics and analytics, FORTE provides a true single point of contact responsible for the complete performance of your distribution network. No finger pointing. No fragmentation of responsibility. No multiple suppliers for technical support. You have performance goals, and it's our job to make sure they're met on an ongoing basis.
-  Total Objectivity - We don't manufacture equipment. We don't develop WMS software. We don't have commercial arrangements with any suppliers for expected volumes of business. We're simply interested in delivering the most efficient distribution solutions at the lowest total cost. Our client-side service approach means our only allegiance is to our customers. So with every engagement, you know we'll choose the most appropriate level and blend of technologies integrated into an effective operational system.
-  Expertise - Our team is deeply rooted in the hands-on implementation of distribution center design and warehouse automation. FORTE's engineers and technicians integrate today's best practices in supply chain management and distribution center operations while developing next-generation technologies. As a result, our solutions employ the best combination of practical advice, data-driven analysis and technology-enabled systems. With FORTE, you get:
  -  More accountability than a consultant
  -  More experience than a systems integrator
  -  More objectivity than a manufacturer

That's why the world's fastest-growing companies are making distribution their FORTE.