

President's Message

Moving beyond wait-and-see



Jack Phelan
President

If there's one word that captures the attitude of many executives as they look at the year ahead, it's "caution." No one wants to get burned or make costly mistakes. Unfortunately, a side effect of caution is often a slowing down of the business metabolism to the point where there is near hibernation. Not knowing what to do translates into inactivity.

It also means squandering a valuable resource: time. For most businesses, the best use of time right now is to embrace a strategic planning process, perhaps the most effective way to get a step ahead of the competition.

The economic downturn has taken its toll on countless companies. To use a boxing analogy, some businesses adopted a regimen for getting down to their "fighting weight," while others have done little or nothing to make themselves better contenders.

Some have gone to extremes in making organizational cuts that have dramatically altered the customer experience—and it isn't positive for either the customer or the company.

Businesses often behave like individuals after a setback. They assume that getting past the problem means they can pick up where they left off. It simply doesn't happen that way, as we all know. Then, why do we think it will work for a company?

From all indications, 2010 is a crucial year for businesses. Before it's literally too late, we need to

ask, "What should we be doing to better position our company when our industry segment starts to rebound?" And if we're not taking action, why not? The chances are that if we "wait and see," we will have missed the opportunity.

Here's the point: *when business is slow for a company, what better time is there to develop plans when its industry segment recovers?*

If we have learned anything over the last 18-24 months, it's that the rules have changed: we must find ways to do more with fewer resources and do it better than our competition. How are we going to accomplish that? How is the competition positioned to accomplish it? What services have our competitors eliminated? Essentially, where are the opportunities?

Apple's CEO Steve Jobs says, "Innovation distinguishes a leader from a follower." The year ahead belongs to leaders. They position themselves to be in the right place at the right time. They're poised and ready with a plan in hand that saves months of time when all signs say it's the moment to act. They give their company a competitive advantage, which enables them to gain market share.

Now is the time to develop your game plan. Typically the costs associated with developing the plans for a project are 3% to 5% of the cost of the project. In addition, this might be the best time to purchase those services because demand is not as high, another example of doing more with less.

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FAQ Frequently Asked Questions

John T. Phelan, Jr.,
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Q. "What are the key elements in planning a new distribution center?"

A. Although distribution centers differ even when the same company operates them, there are planning fundamentals that apply to all distribution center projects.

In initiating an analysis for planning a new distribution center, we begin by gathering all the relevant data to ensure that all of the customer's goals are met:

- Current and future throughput requirements
- Whether there is consolidation into fewer larger DCs or if the objective is to grow a network of small DCs
- Seasonality of products
- Considerations for new product launches
- SKU proliferation expectations
- SKU phase out or reduction expectations
- Preferences for specific technologies or equipment

To plan and design a material handling system for a new distribution center that takes these issues into consideration, the baseline data set includes order line item history for all SKUs, plus physical details of all SKUs.

Through a refined and calculated proprietary process, TriFactor takes into consideration these goals and manipulates the data to determine two critical distribution center factors: 1) amount and type of storage medium for all SKUs and 2) the throughput rate for the shipping sorter. Taken together, these two elements have a huge operational and financial impact on customers, which is why we take them seriously and put forth significant effort to ensure complete accuracy.

For example, we understand from a capital expense perspective that pallet rack is less expensive than a full case pick module and a full case pick module is typically less expensive than a split case pick module.

Operationally, we also understand that split case picking has different throughput and productivity standards compared to

full case picking. Our proprietary data analysis process takes into consideration these capital and operational costs so that we develop the most cost effective, customized solution that reflects the goals identified at the beginning of the process.

Q. "When you say you need order line item history for each SKU, what exactly does that mean?"

A. We need to know, preferably in a spreadsheet or database, the order history that includes: order number, SKU number, SKU description, number of "each picks" for that SKU within that order, number of pallet picks for that SKU within that order, number of case picks for that SKU within that order and the pick date for that SKU within that order. Naturally, this means the data might show many lines (SKUs) for a single order number, which is representative of normal day-to-day distribution activity.

When asking customers for this information, they often claim they don't have it. As it turns out, they have it but just don't know it. Looking at the day-to-day picking and shipping operation in a facility is a simple way to confirm that the information is recorded somewhere.

Distribution center order pickers don't pick an order randomly. Rather, they are directed, either by lights, voice headset, paper pick sheet, RF device or their supervisor and if it is their supervisor, then this person is directed in some way. The bottom line is that the information is stored somewhere; it's just a matter of getting it and conditioning it to be in the proper format.

In addition to acquiring the information in this format, it is also ideal to have it captured over a long period of time, during normal season as well as during a high velocity season. This way, the material handling system, including the storage medium and shipping sorter, can be designed to accommodate normal operations as well as seasonally busy periods.

One of the calculations we perform with this information is SKU pick frequency, which is how often a SKU is picked per

day and how often a SKU is picked per order. Additionally, through a reiterative process, we calculate the number of pick faces per SKU per storage medium, whether at the unit, case or pallet storage level and determine the replenishment requirements.

Since customers have their own unique considerations for replenishment, the requirements are examined and evaluated for acceptability. If the new storage solution per SKU based on our pick frequency calculations requires twice-a-day replenishment, then they might determine that this is too often and requires too much labor. Therefore, we may double the amount of pick faces or simply change storage medium. After that, we would then recalculate the replenishment requirements and reexamine for acceptability. We would do this until the process is complete and the customer is satisfied with the solution.

Q. "What about the actual physical building. Should I design the material handling system first and then look for a building that will accommodate the system or should I find a building first and design a material handling system that would accommodate the building?"

A. Although the answer may challenge the general perception of the process, ideally the material handling system should be designed before the building is selected or designed. The reason is simple: the material handling system represents unique processes critical to the success of distribution operations.

Since the material handling system plays a significant role in how day-to-day operations are accomplished, its design should be one that the customer can live with for years to come. Additionally, calculating the proper footprint is critical since square footage is the primary driver for lease or purchase cost of a building. Therefore, this should be an integral part of the design process. Once the design is determined, the next step is to develop general specifications such as required clear height, required square footage,

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width to length ratio, minimum number of dock doors and location of dock doors.

Again, this may seem counterintuitive, but as previously indicated, there are only a few variables associated with buildings. For example, if we went to a real estate broker and said we need a 500,000 s/f building in Memphis with a 3-to-1 length to width ratio, 26 foot minimum clear height, flow through dock doors with at least five receiving doors on one side and at least 20 shipping doors on the other, we would have a dozen options handed to us.

Additionally, there are other aspects

of the layout of the material handling equipment in the distribution center that play a significant role in the design of the building.

Often times, conveyors are hung from the ceiling joists of the buildings that may require structurally stiffened joists to maintain clear forklift aisles. The sooner we can identify the joists to be stiffened, the better.

Also, the location of electrical distribution panels in a building is equally important. Since the material handling system requires its own industrial control panels with power feeds from the main panel, it

is ideal to identify early on as to where the industrial control panels will be located and then spot the main power as close to them as possible to reduce electrical power pull costs.

The same can be said for the building's compressed air system that will be needed to tap into for the material handling system.

Of course, there are other issues, all of which, if properly planned and taken into consideration, can help reduce startup and operational costs of a new distribution center.

Florida's Distribution Growth

"If they come, we will build it!"

In the 1989 film "Field of Dreams," the mantra was clear, "If you build it, they will come." But for the last few decades, Florida has reacted to a slightly different message, "If they come, we will build it." And come they have.

From a population base of nearly 13 million in 1990, Florida grew to just over 18 million by 2007. And although population growth has slowed substantially due to the sluggish economy, demographers still believe Florida will break the 20 million population mark as early as 2015, and may even surpass New York as the third largest populated state, behind Texas and California.

The recent surge left Polk County with 8.6 million people living within a 100-mile radius, making it the largest population center in the Southeastern United States. And they all need to eat, drink, wear clothes, buy cars, fill prescriptions and furnish homes.

With this huge population base, a state once known for a landscape dotted with orange groves, palm trees and theme parks is now seeing another industry sprouting up along its extensive grid of roads and highways—distribution centers. These sprawling, highly automated wonders, some with up to three million square feet, serve a single purpose, to move products to customers throughout the state and across the Southeast as quickly and efficiently as possible.

In Lakeland, it's a three million square foot distribution center operated by

Publix, the largest supermarket chain in Florida with 700 stores. In Jacksonville, it's Unilever Global's sprawling 700,000 square foot distribution center. Even tiny Frostproof, FL is part of the boom, as Ferguson recently built a 500,000 square foot warehouse to service its many retail heating and plumbing supply outlets.

Jim DeGennaro, Senior Business Marketing Manager at the Central Florida Development Council, says the reason for the unprecedented growth in distribution centers is simple, the population boom of the past two decades. "The demand for distribution always centers on consumers. If people are moving into a particular area, that's where companies will build distribution centers. It's no coincidence that every major Fortune 500 retailer is sited in Polk County or looking to add a location here."

Headquartered in Addison, TX, Mattress Giant Corporation recently opened a large distribution center in Davenport, FL, to support its 123 stores throughout the state. Vice President of Operations Ken Cozart agrees that population growth was a key factor in its decision.

"Statistics confirmed the population had been growing rapidly," said Cozart. "Because of this surge, we outgrew our existing warehouses in Orlando and Tampa, and consolidated our operation in Davenport, which we feel is a more strategic location to better serve our markets and customers."

And the Story Continues

"The population growth we saw up until recently in Central Florida, especially with its network of highways, was a major decision for us to build a distribution center in Haines City, FL," said David Behm, Vice President of Aldi, Inc., which will use its new 500,000 square foot facility to stock the shelves of its 25 grocery stores in the state.

As Executive Director for the Lakeland Economic Development Council, Steve Scruggs has witnessed this huge distribution center growth right in his own backyard, with major companies such as Rooms to Go (1.7 million square feet), Saddle Creek (2.3 million square feet) and Southern Wine & Spirits (653,000 square feet) all leading the charge.

"Distributors are trying to reach as much of the population as they can, while at the same time reducing transportation and labor costs," said Scruggs. "We have been absorbing between one and two million square feet of warehouse space on an annual basis since 1987."

Lakeland's central Florida location recently led a Chicago-based supply chain consulting firm's list of the 10 best warehouse networks in the United States in 2008, based on the lowest possible lead-time from warehouse to customer (1.07 days).

Across the state in Jacksonville, the most populated city in Florida, Broderick Green, Business Recruitment Manager of

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the Cornerstone Regional Development Partnership, a division of the Jacksonville Chamber of Commerce, says the logistic and supply chain business is just as vibrant there.

"Companies are looking for ways to get their products to their customers quicker, and by building distribution centers in key locations, it gives them better access," said Green. "We pride ourselves in letting companies know that we are centrally located, with Atlanta 500 miles to our north, and Miami 500 miles to our south."

Given its strategic location, Jacksonville has seen companies build distribution centers in the region, including Bridgestone/Firestone (1,000,000 square feet), and Dr. Pepper – Cadbury Schweppes (601,500 square feet).

seen this growth, literally, both inside and out. And he believes the reason is obvious.

"Until the last few years, we saw an increasing number of baby boomers moving into Florida," said Phelan, "This was particularly attractive to industries looking to build distribution centers to benefit from this older demographic, such as healthcare and pharmaceuticals. It appears this trend will continue in the future as the economy rebounds."

As automated as some of these distribution centers are today, they don't run themselves. It still takes hundreds, if not thousands of skilled workers to operate their facilities. "It's important to these major companies moving in that they will have access to a skilled workforce and material handling systems integrators that

reputation for doing what they say they'll do, within the time constraints committed to," says Cozart. "We cannot afford to delay an opening because someone didn't meet a deadline. Many activities need to be synchronized, and each is dependent on the other to meet a start date."

Explains Cozart, "We look for companies that are working to make their company and their processes more efficient, environmentally sustainable and offer the latest in design. We like for them to suggest alternatives, based on their past experiences and knowledge in the industry."

Broderick Green says it's all about being proactive. "When a distribution center opens in Jacksonville, we ask them specifically what their needs are. It's helpful if businesses don't have to look outside the state for their workforce, plus it's more cost-effective for them."

According to the chief executive of a large, third party shipping company in Polk County, there was a major problem in finding the right employees for jobs that are becoming increasingly technical.

Logistics University

This need has initiated some major educational changes at several of the state's leading colleges. In Jacksonville, the University of North Florida recently designated its existing Transportation & Logistics Program as a University Flagship, in recognition of the program's response and relevance to the logistics job market heating up. Graduates from this program work at such companies as CSX Corporation and Penser SC. In the past three years at UNF, the number of students seeking a BBA with a major in transportation & logistics has tripled. In addition, MBA concentrations in logistics and supply chain management have more than doubled in the same three years.

As chair of UNF's Marketing & Logistics department, Dr. Adel El-Ansary has seen first-hand the success of the Transportation & Logistics program, which he says has certainly benefited from the university's current president, John Delaney, having been a two-term mayor of Jacksonville before joining UNF in 2004.

"We have seen explosive growth as Jacksonville has proved itself to be the key gateway for the Southeast, and John Delaney witnessed this first-hand when he was the



The Florida facility of WellDyneRX. The pharmacy benefits management company opened their Southeast operations with a new 66,000 square foot building in Lakeland, FL.

While a distribution center's size may seem impressive, it's what goes on inside that dictates if it is accomplishing its goal of moving products quicker and at lower cost. For this task, it relies on a sophisticated and highly automated network of conveyors, control systems, and picking technologies to be in place, to keep productivity high and costs low.

Moving the Product

John T. Phelan, Jr. is Chief Operating Officer of Lakeland, FL-based TriFactor, LLC. His company is one of the region's largest material handling systems integrators and has automated many of the distribution centers dotting the Florida landscape. Phelan has

know the business," adds Phelan. "They are looking to assimilate into the area as smoothly as possible, and many times it is beneficial for them to involve a material handling systems integrator early in the building design phase."

Jim DeGennaro of the Central Florida Development Council concurs. "Having material handling companies located in the community that know how to work with local municipalities and local permitting requirements, adds a comfort level for many of these new companies," said DeGennaro. "It's a major plus to have skilled engineers and contractors readily available."

Mattress Giant's Ken Cozart agrees. "First of all, we look for companies that have a

mayor," said Dr. El-Ansary. "John knew back then the trends that were occurring, and that helped to accelerate the program significantly when he joined UNF. And in my opinion, there is no question that growth will continue right through to 2015."

At least twice a year 30-40 companies converge on UNF for a job recruitment Career Day, and Dr. El-Ansary cites an example of how well this has worked, for both parties. "At one event, a representative from General Mills was there," recalls Dr. El-Ansary. "Turns out he was a student of ours at one time who was recruited by General Mills, and now he is back recruiting future workers."

To train students to succeed in the logistics and supply chain industry, Dr. El-Ansary says it's important to know what issues these companies are facing each day. And he says it's quite simple—"improving effectiveness and improving efficiency."

According to Dr. El-Ansary, "Companies want to improve effectiveness by making sure they can reach their target market in optimal time. Equally important is improving efficiency." As a good example of this, he points to stores like Wal-Mart and Target that are making sure their products reach their shelves as quickly and effectively as possible. And they are doing this "by having all their merchandise tagged with the information they need, such as pricing, before it leaves the distribution center, to save on any added steps once it reaches the stores."

The success of the University of North Florida's Transportation & Logistics Flagship Program (it was recently ranked 13th in the nation by *Supply Chain Management Review*, an industry trade magazine) has led to establishing the University's Logistics Information Technology Solutions Laboratory, which Dr. El-Ansary says will house some of the best supply chain software available, including Oracle Advance Supply Chain Planning and SAP ERP Systems.

Equally impressive are plans currently underway by University of South Florida Polytechnic for the building of a 535-acre campus in Lakeland. The new campus has a projected enrollment of 16,000 students and will focus on such areas as logistics management, supply chain management, RFID and programmable

logic controls, among others. It is expected to open by 2012.

This importance in training skilled workers, particularly in new technology, was a major factor when WellDyneRX, a mail-order prescription and pharmacy benefit management firm headquartered in Centennial, Colorado, made the decision to invest in a \$20 million expansion in Lakeland.

"We were very impressed with the great business environment there," said Damien Lamendola, CEO for WellDyneRX. "But the most important factor was what we saw evolving at USF Polytechnic, and its overall focus on technology. We wanted to build a long-term partnership with them and to work closely with their CEO, Marshall Goodman."



For Mattress Giant's 80,000 square foot facility in Davenport, FL, TriFactor provided and installed heavy-duty teardrop pallet racking with various load capacities to accommodate three-level storage.

As a former Provost of San Jose State University in California's famous "Silicon Valley," Marshall Goodman, Ph.D., was nationally acclaimed for his technology-focused initiatives in incorporating higher education with economic development, which made his move to USF Polytechnic in 2006 a logical choice.

"Even when I was working in Silicon Valley, I could see the future of Florida emerging as a major player in the world economy," said Goodman. "You could see it in the population projections, with only six states showing population growth, and Florida as number one. And all those people are going to require a lot of services."

Goodman says USF Polytechnic is set up

as a niche campus. "Students don't come here to study Shakespeare," he points out. "We understand our business model and that is to provide human capital for companies coming into the region."

Mattress Giant Corporation is one business that appreciates what Goodman has to offer. "A well-educated population offers great opportunities for us to hire qualified, high-energy people with innovative ideas," said Ken Cozart.

"There are a lot of people out there who still maintain the 18th century perception of exactly what a warehouse operation is like," Goodman contends. "They still see it as a bunch of overweight guys pushing around two wheelers. But today's warehouses and

distribution centers are marvels of high-technology, and they use that technology to keep products moving out the door, on time and on track."

Goodman says USF Polytechnic is already working on technology that can track every second of a product's life, to make sure that a bottle of wine sitting on a store shelf didn't also sit for two days in 120-degree heat in a Florida warehouse, simply by having a small electronic chip that tracks time and temperature inserted in the cork.

A perfect example of the technological partnership between the college and incoming industries is a recent trip taken by USF Polytechnic and WellDyneRX to

France to study research by French companies to enhance radio-wave security as more companies turn to RFID.

"We approach incoming companies aggressively, and work hard to convince them that we can train the workers they need to help them to grow," said Dr. Goodman. "Our students tackle real-world problems by working as interns with these businesses, and what they learn they bring back and use to challenge our professors. It's a win-win situation that is good for our students and good for the companies."

TriFactor's John T. Phelan, Jr. also knows the importance of having local schools train future workers on the latest technology. "Having local schools train logistics professionals in the new technology affecting our industry is a terrific benefit," he offers. "It's this continuing education that keeps our workforce constantly up to date with the new technology, which we then pass on to our customers."

Polk State College in Winter Haven has also been a leader in Florida in training future logistics and supply chain management personnel. The United States Department of Transportation (DOT) recently awarded a \$1.2 million grant to Polk State College's Supply Chain Management Institute. The funds will be used to fine tune the Supply Chain Management Institute's curriculum, establish a technically advanced training lab featuring new computer hardware and software, and provide scholarship assistance for incumbent workers in the supply chain field who wish to pursue studies at the institute.

On the surface, it appears that the sky is the limit for the Sunshine State, as more and more distribution centers continue to crop up. The most ambitious project is CSX Railroad's \$100 million plan to build a 1,250-acre integrated logistics center in Winter Haven, which will include three million square feet of warehouse space.

But can future growth be a case of too much of a good thing? It can, says Jacksonville's Broderick Green, particularly if it is just growth for growth's sake.

"That would be a major mistake because it just doesn't work," he said. "We're not out there trying to land the 'next great deal.' We are looking to bring in companies that we can help grow and be successful. There is nothing to be gained and everything to

lose, by bringing in a new business and watching it fold."

Adds Lakeland EDC's Steve Scruggs, "I believe that retention is the most important part of bringing in new business." It's this philosophy that played a role in WellDyneRX's plan to move to Florida. "I was impressed by Scruggs' belief that it isn't all about just attracting trophy businesses," explained CEO Damien Lamendola.



GTECH's new 98,000 square foot facility in Lakeland, FL. (photo courtesy of Aero Photo)

The Turning of the Tide

"The housing market and the general economy were stable and growing when we began planning our new distribution center in Davenport in 2007," recalled Mattress Giant's Ken Cozart. "Like many other companies, we did not see this current market condition coming at that time."

Without a doubt, a staggering economy, fueled by a meltdown in Florida's housing market, has slowed things considerably in the past few years. But there are some positive factors, in spite of what appears to be a somewhat dire outlook.

According to Marketbeat, an industrial report published by real estate giant Cushman & Wakefield at the end of 2008, "While the continuing slowdown in the economy and the still deteriorating residential real estate market has adversely affected all the major industrial markets throughout Florida over the course of 2008, Lakeland's industrial market continues to demonstrate the strength of the market's location and affordable real estate costs by recording positive absorption over the last 12 months."

Although statistics show that in spite of the general economy, Lakeland and Jacksonville were the only two markets in Florida to have total positive absorption in 2008, the situation hasn't completely halted all activity in the distribution industry in other regions of the state.

"We have a lot of companies telling us they are looking at the economy and trying to be both conservative and creative at the

same time," said Central Florida Development Council's Jim DeGennaro. "They are being conservative by temporarily putting on hold any new construction. But at the same time, they are being creative by looking at ways to expand their current facilities, whether it's building up or building out."

He points out, "We currently have 25 million square feet on hold right now, spread over more than 5,000 acres." Companies tell DeGennaro that they are still heavily invested in Florida, and believe that the state "will rebound as it has in the past."

"When it does get better, and we start to see two-percent population growth again, which many experts believe will start happening around the middle of 2010, we'll be ready to start revving up once more," he adds.

Although Aldi, Inc. made the decision to build in Haines City at the height of the population boom, the company says the slowdown has had no effect on its plans to move forward, and in some ways, may have helped. "Even without future growth, the population in Florida as it currently

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stands is attractive to our company," said Aldi, Inc.'s Vice President, David Behm. "The slowdown actually makes shoppers reconsider their shopping habits and shopping patterns more carefully, and we have found them to embrace our stores, which are new to the market."

Ken Cozart agrees that the decision was the right one at the time. "This is still an excellent market for us, and we are confident that both housing and the general economy will come back."

Indications are that when the economy improves, the housing situation rebounds

(as one industry analyst puts it, "Housing got us into the recession, and housing will get us out of it"), and an aging population continues to migrate south, led by the baby boomers as their financial investments start to recover, that Florida will resume its growth and development in the distribution industry. So confident is Jacksonville that the economy will bounce back soon and the distribution industry will stay strong and vibrant, that the city has adopted signage labeling Jacksonville as "Logistics Capital of America."

Equally confident is the University of

North Florida, as the college has invested additional dollars in the Transportation & Logistics Program. UNF's Dr. Adel El-Ansary says the program is important because companies are going to need the right people to run the supply chain.

Dr. Marshall Goodman at USF-Polytechnic agrees, "I am very confident that Florida will continue to play a major role, especially with the new technology we are starting to see. And that new technology is what will drive the logistics and supply chain industry forward in the future."



Get ahead of the competition: Ten strategies for giving your Distribution Center or Warehouse a recovery advantage

John T. Phelan, Jr.,
P.E., COO

In spite of the optimistic signs that the recession is receding, it would be illusionary to believe that everything will revert to the way things used to be. As a result of the economic turmoil, distribution centers are experiencing fundamental changes and redefining their relationship with material handling integrators. Together, these factors will shape the post-recession era. Here is an assessment of what distribution centers need to do to gain competitive advantage in the year ahead and even beyond.

1. Green Technologies. Propelled by efficiency, consumer awareness and increased regulation, green initiatives will gain momentum in the recovery. A rapidly emerging, environmentally-friendly technology in the low voltage arena, the 24-volt motorized drive roller (MDR) conveyor, will see increased demand in 2010 as the price becomes more in line with conventional AC powered conveyors. Running only when necessary and offering a high degree of modularity, the MDR conveyors combine efficiency, ergonomic design, reduced noise levels, and low maintenance with 30% to 60% energy savings.

The green movement will also affect existing equipment. Programmable logic controllers (PLCs) will be reprogrammed and photo eye sensors added, enhancing energy efficiency with a Sleep Mode that detects the presence of product, automatically shutting down certain sections where there is little or no product and restarting when demand increases. Start up sequences of the conveyor system will also be reprogrammed so that motors turn on one at a time, decreasing the energy spike resulting when all motors start at the same time.



The energy-efficient 24V MDR will continue to be one of the mainstays as green technology continues to thrive in 2010

2. Multi-channel distribution under one roof. In recent years, a new distribution paradigm has emerged as organizations are increasingly integrating their distribution channels under one roof. This has proved a vexing task for many organizations that traditionally developed their channels as separate silos; however, there are significant cost-saving advantages in high speed order fulfillment, tight inventory controls, and management of numerous SKUs, new product additions, and increased changeovers when channels are properly integrated.

Complexities increase because warehouse requirements vary by channel, necessitating more rigorous planning. For example, direct-to-consumer involves a high unit pick volume and requires high

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technology solutions such as A-Frames, Pick to Light, Pick to Voice coupled with carton flow pick modules.

On the other hand, the retail distribution channel typically does not have many unit picks, but is mostly case and full pallet picks, and the wholesale distribution channel normally requires full pallet shipments and inventory control software to ensure that the pallets of goods meet the requirements to ship wholesale. In addition, each channel has different needs with regard to cost-effective outbound transportation.

Furthermore, distributors are called upon to do more things, with more variety. There are rising expectations to receive the product as needed, and distributors will be expected to provide "value added services," such as special packaging or adding promotional materials.

These changes have profound implications for the relationship between integrators and distributors as distributors look to integrators to provide creative, flexible solutions, not just equipment. Advanced planning – often taking nine to twelve months – will become intrinsic to the process.

3. Understand vendor consolidation. Look for continued consolidation of manufacturers in 2010 and beyond. The credit crunch and broad recessionary pressures have created significant opportunities for distressed merger and acquisition activity among both small and large companies. In 2009, the largest pallet rack manufacturer in the world, Mecalux Group, acquired the largest rack manufacturer in the United States, Interlake Material Handling, Inc., out of bankruptcy. Additionally, two conveyor manufacturing powerhouses combined when Intelligrated purchased FKI Logistex.

Distributors working with integrators that can still draw from multiple lines will be in a better position to obtain objective and unbiased solutions.

4. Productivity reporting. Pervasive uncertainty and cost pressures will continue to impact distributors in 2010, intensifying the need to monitor carefully productivity and identify opportunities to improve efficiency. Software has the capability to provide operational performance data across various departments/functions down to work shifts or an individual employee. Expect to see more of it in 2010.

5. Automation: checkweighers. The bar will be raised on quality control in 2010 and automation will be the answer. Checkweighers protect against unacceptable under or overweight packages reaching customers. More distributors will recognize the opportunity to increase profitability and minimize customer complaints through tighter processing and packaging controls.

6. Not just speed, lower costs: crossdocking at the DC. An old concept, crossdocking is gaining renewed interest. Moving product directly to shipping from receiving eliminates unnecessary tasks and reduces costs. It is best done with a receiving conveyor system that integrates with the warehouse management system and the warehouse control system. While accelerating speed to market remains a critical goal, real time control that cuts costs and adds agility in the supply chain during these challenging economic times will drive crossdocking decisions in 2010.

7. Automated pallet building and wrapping. The shift toward smaller, more frequent shipments and demand for

processing orders with ever increasing speed will continue in 2010. Accuracy and minimal product damage in order fulfillment is vital and automated pallet building is an easy to justify answer. With advances in technology and an expanded supplier base, payback on automated pallet building can be achieved in less than one year. Some palletizers are also equipped with automatic stretchwrappers, adding more functionality by combining the two labor-intensive operations.

Those adopting the technology in 2010 will benefit from reduced labor costs, improved safety, and a higher degree of order accuracy.

8. Automated print & apply labeling. Another labor-intensive area that will see increased automation in 2010 is printing and applying labels. Automatic label application provides significant time savings, as well as consistency and accuracy. Incorporating a box erector prior to the label operation adds functionality and further reduces labor costs. ROI varies with the number of shifts/people performing the operation, with the payback period significantly shortened when multiple shifts/people are involved.

9. Velocity analysis and slotting. The reoccurring theme of cost reduction in 2010 will foster efficiency-producing measures that drive down costs in storing, picking and replenishment operations. Measuring product velocity, or how much and how often the SKU is picked at various durations of the year, identifies fast, medium and slow movers and places high-velocity SKUs in readily accessible and ergonomically friendly pick areas. Of critical importance in 2010 will be the ability to adapt with agility to changing demands and changing SKU velocities.

Further strengthening the slotting of SKUs, the physical dimensions of each SKU package can be determined automatically with product dimensioning systems, like the Cubiscan. This measures dimensions and weights and feeds the data into the inventory management system, eliminating human errors and assuring the most efficient packaging.

10. Outsourcing. Labor force reductions mean either downsizing or eliminating engineering departments and in-house maintenance staffs. Increasingly, outsourcing is a viable option, a way to move from fixed to variable costs. In 2010 look for more companies to seek trustworthy partners to perform engineering and maintenance functions.

Faced with increased complexity and rising costs, others will take even more sweeping steps and outsource entire distribution operations. The year 2010 will see the continued maturing of the 3PL industry with a focus on keeping the supply chain management efficient and priced right for customers. Those who use the economic climate as a catalyst for innovation and leverage their existing technologies and workforce will emerge as leaders.

The recession's impact on distribution will not fade quickly. While the trends of the green movement, consolidation, automation and technology are not new to the industry, they will take on new direction in the years ahead as cost savings, agility and flexibility will be the key drivers. Driven by residual uncertainty and relentless pressure to reduce costs, distributors will scrutinize their relationships and demand new ways to do business. The desire to realize increased value will dominate during the post-recession era and material handling integrators had better be ready.

Featured product

Needs Analysis: knowledge drives results

Everyone in business agrees that solving problems before they occur saves both time and money. Yet, when faced with the pressure to complete a project, it's easy to forget about what can go wrong by moving ahead too quickly. In order to alleviate customers from making hasty decisions and subsequent mistakes, TriFactor's solution process provides customers an outsider's perspective by experts that design and build material handling systems routinely.

The Needs Analysis is the first step in the TriFactor Edge three-step solution process for designing and implementing a complex material handling system. It is applicable for the construction of a new distribution center as well as the reengineering or expansion of an existing distribution center.

Companies that utilize the Needs Analysis are typically those that do not have engineers on staff that are experienced in designing and self-implementing a complex material handling system. Rather, these companies undergo an intricate project once every three to five years and thus need the expertise and experience of TriFactor's engineering staff to successfully guide them through the entire process.

The Needs Analysis itself consists of an eight-step process that starts with project initiation and ends with a final presentation. In between, the assigned TriFactor engineer generates and reviews

drawings, understands staffing levels, creates flowchart of processes, analyzes order history and SKU velocity data, learns about specific inventory requirements such as LIFO or FIFO, identifies additional required processes such as value added services or quality control and a host of other unique operational characteristics of the customer.

When all of the technical knowledge is digested, the TriFactor engineer develops conceptual solutions and interactively reviews them with all stakeholders for input. Eventually, a high level solution is collectively accepted and the engineer develops overall system budget pricing and the anticipated implementation timeline. Additionally, we perform a financial analysis of the project by computing 6 different forms of return on investment calculations.

In the end, customers that have used this tool have started off their projects with a greater understanding of many aspects of their venture. Additionally, the report and findings have also been used for capital planning purposes or submitted with request for capital funding approvals.

A material handling system Needs Analysis offers TriFactor customers the assurance that there will be no surprises before a project begins.

TriFactor to Hold Seminar on Warehouse and Distribution Center Planning

A well-designed and well-planned warehouse or distribution center offers multiple advantages in the fight to remain competitive and successful. By taking the necessary steps to see the project through from start to finish, the result will be a facility that operates efficiently, uses space effectively, maintains cost control, and in the end achieves its ultimate goal of meeting expectations.

But first, a detailed planning process has to be put together because having to tack on additional capital outlays five to seven years down the road will be costly. Misjudging a projection of inventory and how it is to be stored and moved can be a costly error as a 20% deviation on a 200,000 square foot storage area can result in a 40,000 square foot shortfall or surplus.

To ensure you plan right the first time, TriFactor is sponsoring a seminar focusing on the critical factors needed to plan a successful warehouse and distribution center.

The seminar will be held at two locations; Wednesday, October 21 at the Radisson Hotel, 4700 Salisbury Road in Jacksonville, FL, and Wednesday, October 28 at the TriFactor Learning Center, 2401 Drane Field Road in Lakeland. The program runs from 9:00 a.m. to 11:00 a.m. A continental breakfast precedes the seminar, beginning at 8:30 a.m.

The seminar, "Critical Steps in Properly Planning a Distribution Center," will be presented by Craig Bertorello, Vice President of Operations at TriFactor, who has 16 years experience in designing and implementing material handling systems. He holds a BS degree

in Industrial Engineering from the University of South Florida.

Craig will focus on a seven-step process that is key to successful warehouse planning, which will include:

- *Defining goals and objectives*
- *Documenting the process*
- *Collecting information and data*
- *Performing an analysis*
- *Creating a detailed project plan*
- *Proper implementation*
- *The post-project review*

"By focusing on a layout that fits storage and activity levels, you can reduce construction costs that occur from mistakes," offers TriFactor's Craig Bertorello. "This seminar will show how to position your company for projected future needs and to get the highest return on investment through efficient design. Companies looking to change the layout of their current warehouse or planning a new warehouse or distribution center will benefit from the seminar."

Topics also discussed will include product storage, increasing throughput, process flow, slotting analysis, and more. The seminar will benefit anyone who plays a role in the distribution center planning process, including presidents and CEOs, VPs of operations and engineering, and warehouse/distribution managers.

There is no fee for the seminar but reservations are requested.

To reserve a spot please call 800-282-8468, or visit www.trifactor.com/Seminar-Information-and-Sign-Up

Planning for the 2010 Holiday Season

Planning takes time and it's not too late to lay the groundwork for the 2010 holiday season.

That includes evaluating current operations and documenting the things that need to be done during 2010, particularly as there are hints of recovery from the recession.

Here is a checklist of 13 items to document now to prepare for the 2010 holiday season.

1. Perform a product slotting analysis. This will help ensure that all SKUs are in the proper storage type and location in order to maximize warehouse efficiency. It's also a means to track slotting actions from the previous year.

2. Create a system log. This can be either automatic or manual, and should document jams, downtime and equipment failures for different aspects of the system. It will also help identify important problem areas.

3. Explore alternate picking technologies. Scope out various types of picking options prior to next year's holiday season, including RFID, handheld, voice-to-pick and pick-to-light.

4. Determine efficiency and ROI metrics. This is key as you look to determine whether any manually intensive operations may warrant automation in 2010.

5. Document safety issues in the warehouse. Has workplace safety been compromised due to the increased volume/workload? If so, determine and implement remedies to eliminate safety issues centered on areas such as conveyor catch points and conveyor crossovers.

6. Audit your scanning system's accuracy. This will determine if there should be a switch in the types of scanners you use, perhaps as a result of changes in the barcodes utilized during the past year. This might be easier to determine during the peak Holiday Season due to the increased volume.

7. Audit the system's energy usage during peak periods. By doing so, you can determine if there are any equipment and/or program changes that can reduce the increase in energy consumption during peak periods.

8. Audit pallet type and quality (if applicable). This will determine if there are compatibility issues between the type of conveyor being utilized and the type and/or quality of the pallets in the system.

9. Extract a large amount of order data. Focus on the months preceding the start of the holiday season. Then, at the height of the season, you should extract order data once again. This will help you understand changes in product movement so

that the storage, picking, and other operations are adequately prepared.

10. Tune up the system prior to the ramp up. Conduct a mechanical and electrical audit to ensure that all wear items have been adequately replaced or lubricated. Also, review the critical spare parts list and ensure that enough spare parts are stocked so that in the event of a system breakdown, repairs can be made quickly without disrupting operations.

11. Implement system training. With the increase in throughput, distribution centers typically observe additional seasonal labor and an increase in the number of work shifts. As a result, employees may not be familiar with how certain equipment



Doing an audit of the different pallet types will determine if there are compatibility issues.

operates. Proper training should be put into place.

12. Watch for system malfunctions. Keep an eye out for all points on the conveyor system where frequent jams can occur due to increase in volume or back up develops due to insufficient accumulation space on the conveyor. This can cause a shutdown in such operations as order picking. Understanding where all of the chokepoints are in a system during peak throughput will allow you to plan for it during the next peak season.

13. Ramp up on typical distribution supplies. Don't overlook items such as stretch wrapping material, labels, dunnage, tape, and other supplies that tend to go quickly when throughput increases.

The calendar might say 2009, but the time is now to plan for the 2010 Holiday Season. And by following this 13-step checklist, you'll most likely be ahead of the game and well on the way to a successful and profitable 2010.



Larry Boroff
Project Manager

Considerations When Selecting a Sortation System

“A place for everything and everything in its place” is a philosophy nowhere more applicable than when

you’re overseeing a multi-million dollar distribution center (DC). A DC lives and dies on knowing when and where everything is received, stored, and shipped out.

Tracking the “history” of a single carton sitting in its storage location is difficult enough. Keeping track of it at speeds of up to 600-feet per minute is a totally different challenge. That’s precisely when a company needs to determine if a sortation system is justified and if so, which sortation system is right for its operation.

A sortation system (sorter) is an integrated material handling conveyor system that automatically diverts product to a conveyor or chute for delivery to other areas of the DC including put-away, consolidation, replenishment, picking, audit, and outbound shipments. A sorter usually is chosen when the required speed and accuracy of an operation are too great to compensate for with manual labor.

An example would be a distribution center that receives truckloads of



A Narrow Belt Sorter with 30 degree diverts that pop up in a wave fashion.

unsorted boxes of running shoes and sorts them onto pallets by style, size, width, and color. Unfortunately, every size comes in shoeboxes that look exactly like every other shoebox, except for the barcode label. Needless to say, it would be a nightmare scenario to manually sort and palletize several thousand boxes of shoes.

However, a sortation system can identify and sort based on the desired characteristic to a specific location so they can eventually be consolidated onto a pallet for further processing or storage.

Obviously, this solution requires that the DC receives and ships a large enough quantity of shoes to justify a sufficient payback timeline or return on investment (ROI). When calculating ROI one must consider such factors as the cost of land, labor, inventory and taxes to justify an automated sortation solution. So where does one begin?

Choosing the right sorter depends on several factors. To assure accuracy, a significant amount of time should be invested in understanding the entire process and interviewing all work cells and levels of operation. These questions will typically help narrow the options for a shipping sorter:

1. What are the goals? Specify the needs among speed, accuracy, reducing human touches, freeing up floor space, process changes, building expansion, etc.

2. What are the product characteristics (dimensions, weights and types)? Cartons smaller than 6" wide x 9" long x 1" tall in any dimension will affect the choice of conveyor and sorter technology. Plastic bags or different pallet types will also severely limit technology selection.

3. Is the product trucked by pallet load, individual cartons or in another fashion?

4. Will cartons be shrink-wrapped or have other reflective properties? This adds complexity to the system’s equipment selection such as scanners and photo eyes.

5. Does each individual carton have a readable (via inline scanner) bar code and where is the bar code located on the product?

6. What is the average weight and the maximum weight of the product? This will affect equipment selection and/or drive size requirements.

7. How many cartons will be conveyed and sorted across a specific amount of time? Simple math provides the average throughput rate required for the system.

8. What is the system’s expected peak rate? In most cases, an operation will have busier times of day than others and so a system will need to, whenever feasible, be designed for the required peak rate.

9. If it is a shipping sortation system, how many dock doors will the sorter feed? Can this number of doors accept the volume of product being delivered by the sorter?

10. What is the anticipated growth of operations? Typically, a sorter should be designed to accommodate at least three years of future business growth. Additionally, one should also have a strategy for sortation system modifications to support long-term (5-10 years) growth.

These key questions can help narrow the applicable sortation options to begin understanding the rough cost. However, there are many other questions that should be answered before making a final selection. In fact, if the solution provider does not spend as much or more time up-front understanding the operational requirements needed to design the system, then there’s a very good chance that the system will not perform as expected. With so many considerations, how does one choose the proper type of sorter?

Once you have determined your goals, needs and system requirements, it’s time to analyze what type of sortation system will best satisfy your company’s needs. There are a number of sortation systems available, depending on what you wish to accomplish and they are based on high, medium and low throughput rate.

At this point, it should be noted that with the global push towards “green” solutions, the rising cost of electricity and the anticipated carbon reduction legislation, it is prudent to consider a low-voltage, 24 volt DC (VDC) sortation system. This is where the marketplace is heading due to energy, ergonomics, safety, maintainability, modularity, floor space utilization and noise concerns. Plus, they are rapidly becoming very cost competitive with standard AC voltage technology. Their throughput rate typically falls within the medium category.

Continued on page 12

High Throughput Sorters – Greater Than 60 Product Sorts per Minute (PPM)

1. *Sliding Shoe Sorter* (rate range: 70-200 PPM targeted range)*

The high initial investment and additional required sound dampening may deter some operations from selecting a sliding shoe sorter. However, it works well when handling high volume and a variety of product sizes, since it is a push type rather than a pull type. The product is conveyed on a series of closely linked "slats" that are generally constructed of hollow-extruded, 3" to 4" wide aluminum tubes.

The flat surface and closely linked slats have very little open gap between them, which makes them excellent for handling a variety of different sized products. Upon each slat is a "shoe" that wraps around the slat so it slides easily and always remains attached to the same slat. When the moving product is near its intended divert destination, multiple shoes slide and push the product down a chute or a conveyor section known as a spur.

Because of the product's high speed (400-600+ feet per minute), the spur is usually a gravity-sensitive design to minimize product rotating and causing jams in the throat of the spur. This also provides a tertiary advantage of minimal maintenance and no electrical power required for the spurs. Minimal maintenance does not come without preventative inspections to the sorter.

2. *Cross-Belt or Tilt-Tray Sorter* (rate range: 60+ PPM; maximum rate varies depending on number of induction locations)

These sorters are usually chosen for retail and postal distribution centers because they can handle a wide variety of products from CDs and Ziploc bagged products to large/heavy postal bags. Since these systems also have the highest initial costs, this usually limits them to large applications with specifications that are impossible to accomplish with a conventional sorter.

Operations calling for a cross-belt or tilt-tray sorter benefit from the availability of multiple induction points. Cross-belts and tilt-trays circulate in a horizontal loop

by running on a single rail system. The difference is that a cross-belt has short individual conveyor sections oriented 90° to the direction of travel. When the cross-belt arrives at the desired divert location, the conveyor runs either left or right to discharge the item. The width of the cross-belt will vary based upon maximum product size, but they are typically less than 20" wide which means they are usually specified for smaller items that are



A tote being diverted on a sliding shoe sorter.

difficult to handle.

A tilt-tray is very similar to a cross-belt except product is inducted onto a concave or box-shaped tray. When the tray arrives at the desired divert location, it tilts either left or right to discharge the item. The width of the tilt-tray will also vary based on maximum product size. However, these sorters are generally specified for larger/heavier items since it is quicker, easier and less costly to pneumatically/electrically tilt a tray than to start a conveyor from a dead stop under a heavy load. The sorter typically discharges to chutes due to cost savings when used with a high number of divert locations.

3. *30° Narrow Belt Sorter* (rate range: 60-110 PPM targeted range)

There's one patented narrow-belt sorter design that can achieve rates above 100 PPM due to a unique divert mechanism and patented controls logic. This design raises and lowers each row of divert wheels independently in a wave action.

This allows a significant reduction in the amount of gap required between products. This, in turn, substantially increases the throughput rate.

Medium Throughput Sorters – Between 20 and 60 PPM

1. *24 Volt Direct Current (24 VDC) Sorter* (Rate range: 0-40 PPM)

The 24 VDC boasts significantly reduced power consumption and does not require expensive induction equipment.

Different from standard AC voltage systems, product accumulation is also possible between divert points, as well as on inclines or declines. This is very helpful in shipping sorter applications.

With very low noise, fewer safety considerations, reduced air compressor requirements, low spare parts inventory, lower maintenance costs, and easy to maintain equipment, 24 VDC systems are an excellent choice to consider whenever throughput rates are below 40 PPM.

The disadvantage is that the initial cost may be higher, although it varies depending upon manufacturer. The divert mechanism is typically either pivoting or pop-up style wheels similar to those described below. Or at a throughput rate of less than 20 PPM, one can also use a 90° transfer divert (described further below). Take-away methods are 24 VDC powered spurs, gravity conveyors or gravity chutes.

2. *Pivot-wheel sorters* (rate range: 40-70 PPM targeted range)

With pivot-wheel sorters, the product is conveyed on top of a belt that is the full conveyor width and at each divert location is a divert section with several smaller divert wheels that spin about 40% faster than the speed of the belt. As the product nears the divert spur, the sorter uses cams or pistons to rotate/pivot these wheels to divert product at a 30° angle. The rotated wheels cause the product to divert off onto a powered or gravity spur, or a chute.

Often times, a slave-driven, powered spur is the preferred choice for a few reasons. First, it uses very little electricity since it is slave driven. Second, since there is no motor, the maintenance requirements are significantly lower than for a motor-driven powered spur.

Third, the slave-driven power will help divert the product more reliably and with fewer jams than the gravity spur or chute. This pivot style sorter also tends to divert product more reliably than the pop-up wheel sorter (with one exception). Although bi-directional sorting is possible, additional equipment is required, which may contribute to frequent jams when a variety of sizes, weights and products are sorted.

3. Pop-up wheel sorters (rate range: 40-70 PPM targeted range. See exceptions below)

This sorter is quite similar to the pivot-wheel sorter. Instead of rotating/pivoting, however, the wheels are preset to a specific angle and then are very quickly raised and lowered using cams or pistons to divert the product. The only other difference is that a pivot-wheel sorter tends to have slightly fewer nuisance jams. This seems to become more evident when conveying product without a firm, flat bottom surface, such as lower grade corrugated or dimpled totes. Included within the family of pop-wheel sorters is the narrow-belt sorter. This sorter is nearly identical to the pop-up wheel sorter except that instead of the conveying belt being full width, it is comprised of several 1"-2" strip belts spaced 2"-3" apart. This sorter is not typically used for the split-case picking operation since it requires a larger floor space. Also, one will frequently see the 90° narrow-belt sorter in use with small products, such as music CDs, which only cross-belts

and tilt-trays can offer, but at a much higher price. Both the lineshaft and narrow-belt styles can, without sacrificing additional floor space, also be configured to sort products bi-directionally (left and right).

Low Throughput Sorters – Between 0 and 20 PPM

1. 90° Transfer sorters (rate range: 0-20+ PPM targeted range)

The two main types of 90° transfer sorters are lineshaft and narrow belt. Lineshaft sorters continue to lose market share due to their limitations versus other types of sorters and a reduction in their previous cost advantage. However, they are still frequently used in split-case (pick and pass) applications due to good space utilization, low-pressure accumulation capabilities and reduced power requirements.

Within a small footprint, a tote (or cartons) dedicated to a single order requiring multiple items (eaches) can be sorted to both sides of the lineshaft conveyor every 50'-100'. This allows an operator to pick individual items from carton flow rack located in their area (zone), place those items into the tote and then put the tote back on the conveyor so it can be sorted directly to the next picking zone. This setup significantly reduces order fulfillment time and labor costs since pickers only need to concentrate on their smaller zone. The pickers become very familiar with where each item is specifically located in the rack and they don't need to walk long distances.

Once the tote is automatically sorted to the next zone, another picker is waiting to add more items to the tote. This continues until the order is complete and the tote is conveyed out of the carton flow area for packaging or shipment.

2. Pusher and Swing-Arm sorters (rate range: 0-20 Product Sorts per Minute (PPM) targeted range)

Pusher and Swing-Arm sorters have a low initial cost but are quickly becoming obsolete technology or only used in unique situations due the potential for product damage, high noise, low throughput rates and large required footprints or gaps between products.

Advances in sortation, such as the arrival of radio frequency (RFID) barcoding, have significantly changed the sorting landscape. Distribution centers can now, with

99.5% accuracy, establish the number of products in the warehouse, their specific location, where they are to be moved, and where they are to be shipped.

Barcodes interface with a Warehouse Management System (WMS) to act like a traffic cop to track the movement of all items. The manual inventory tracking of the products is no longer necessary, eliminating not only human error but the need for "human touch" to move product from Point A to Point B. Along with giving more accurate counts, the RFID can help increase speed and, ultimately, productivity.

However, the additional cost to implement an RFID system—a label with a radio chip is used instead of a traditional barcode—many DC operations are still in the "discussion" phase. As the cost-versus-benefits gap continues to narrow slowly, an RFID system that can track an item from inception through manufacturing will become more of a necessity. The medical device and prescription drug industry will most likely be among the first to implement RFID systems, where both speed and accuracy are required.

The value of a sortation system was best expressed by a facility manager who pointed out, "In the time it takes a human being to read a label on a single carton and determine where it needs to go, a high-speed sorter can read and act upon upwards of hundreds of cartons." And when a distribution center is handling over a million units per week, that increase in throughput translates into a boost in productivity that's difficult to ignore. Evaluating your company's situation regarding your storage requirements, shipping specifications, and most importantly your future goals, provides a helpful analysis to determine if an automated sortation system is right for your operation.

** Note: All sorter rates specified are a conservative rule-of-thumb that can be achieved for nearly all applications. Although higher rates may be obtainable, the specific application, product size, product type, type of induction system and scanner technology will dictate the maximum rate. So please practice due diligence and realize that sales and marketing literature will typically publish maximum rates which are only achievable under a*