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Guidelines for Choosing a Conveyor System

By Craig R. Bertorello

Choosing the right conveyor system can be an overwhelming task for the warehouse or distribution center professional. Managers and planners often face a series of dilemmas when attempting to identify, develop and purchase the "ideal" material handling system.

Depending on the operation, the product to be handled and the application requirements, systems can vary from the very simplistic to the extremely complex. While various types of equipment are available to satisfy an application's needs, the best mindset when considering a conveyor system is to be sure the system is designed with specific characteristics in mind: 1) ease of adaptability to changing needs; 2) operationally safe; 3) reliable and requiring minimal maintenance; 4) energy efficient and designed around "green" principles; 5) most important of all, cost effective to operate.

Both conventional wisdom and the traditional mindset have erroneously devalued conveyors over time, regarding them as little more than non-value added equipment that does no more than move product through a warehouse or distribution center. This is why conveyors (and the material handling systems of which they are components) are typically the last elements considered in the process planning cycle.

Further, conveyors are also among the last equipment purchased, which is why purchase decisions are often made on the basis of initial acquisition cost, and not on the basis of total acquisition cost or overall value.

This common view of "commoditizing" conveyors is full of risk and exposure to the operation. The wrong conveyor type, or even a suitable type applied incorrectly, or for the wrong reasons, can quickly undermine the warehouse or distribution center's operating efficiency and long-term strategy, often dissolving profitability and/or stripping a company of its competitive advantages. So, what is a more appropriate way to approach a conveyor system and what should you look for in the "ideal" system?

The common requirements for conveyors systems in all warehouse and distribution environments are to transport product between successive steps in the order fulfillment process, and to provide accumulation buffers throughout the process to allow for workflow balancing when considering the different processing rates associated with each step in the process. Accumulation buffers can also enable ongoing production during localized backups or downtime elsewhere downstream in the process.

There are a number of specific features or characteristics to look for when designing, evaluating, selecting and choosing conveyors for your system:

Modularity. Regardless of the type of conveyor required, look for modularity. Select conveyors that feature pre-engineered sections, modules and components that can be freely combined to provide an initial customized layout, but can also be easily reconfigured if necessary.

Flexibility. Look for conveyors that can easily accommodate various product sizes, specifically greater widths. Also, look for conveyors that can satisfy today's demands, but can also accommodate future throughput growth requirements.

Scalability. Whether your planning horizon is short or long, select conveyors that will facilitate growth and adaptability to change over time. The "ideal" system will incorporate both modularity and flexibility to account for an extensive range of product types and sizes and also allow for increased throughput over time. The system should be capable of being "extended" and/or reconfigured as needed to adapt to future needs and requirements.

Safety. Certain types of conveyors include built-in safety features, while others may require additional guarding to protect employees who directly interface with the equipment. **Ergonomics.** A conveyor system designed with proper ergonomics creates a better work environment, increases productivity and reduces operator injuries. Don't necessarily make a decision based on "typical guidelines." Rather, look closely at your workforce and determine what makes the most sense for your unique operation.

Reliability. Select conveyors that have withstood the test of time. Focus on "leading edge," rather than "bleeding edge," technology. Look for conveyors that have been in operation for some time. Contact current users and references to discuss performance and reliability over time. Managers generally develop a greater appreciation for the value of their conveyors when they are down.

Maintainability. While you shouldn't limit conveyor selection to the level of maintenance expertise that supports your

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operation, you certainly want to select conveyors that are easy to maintain.

Clearly, most people take their conveyor system's benefits for granted until the system is down. So, the easier it is to maintain and repair the system, the less impact there will be on operations when it goes down.

Energy efficiency. While certain conveyors use less energy than others, energy efficient principles can be applied to all types of conveyors. Something as simple as programming individual conveyors or parts of the system to shut down or enter "sleep" mode during periods of inactivity can result in significant cost savings. Sequential or staggered start-up of motors in a large system can also help limit the peak power draw.

Having discussed some of the critical characteristics when selecting conveyors, what is important when designing and applying conveyors?

Know your product. The importance of knowing product or products that a conveyor system will be handling is of critical importance. Too often, however, not enough attention is given to it.

The old saying "garbage in = garbage out" is certainly appropriate in the design phase. Detailed design criteria should be clearly described and identified. What type of product is being conveyed? How are the products being conveyed and in what orientation? Where are bar code labels located on the products? What is the dimensional data for each product? What are the maximum, minimum and average dimensions (length, width, height)? What is the maximum weight of the products? What is the live load or average weight per foot of product?

These basic questions are critical to selecting the right size conveyor and determining limiting factors such as belt pull and horsepower calculations for the individual conveyors.

A word of caution: more than once those involved in conveyor system selection have neglected to give attention to the details when developing the system design criteria, and later paid a price when attempting to introduce out-of-spec products to the system.

Know your system needs. For a successful and sustainable operation, it is imperative to know your system requirements. How are orders being picked and introduced to the system and at what rate? How does the picking rate relate to the packing or processing rates downstream? How many orders must be shipped over time, in a week and in a day? How and when are orders introduced to the system? Is the business seasonal or cyclical and, if so, what do peak output requirements look like versus a normal distribution of output? Are there sales, marketing or shipping policies that dictate peak times within each day that the system must accommodate? What are requirements for the most demanding hour of the day? What do growth projections look like and what is the system's planning horizon?

The answers to these questions help determine the types of conveyors that are appropriate and assist in identifying where accumulation is required in the system and how much is appropriate. They also aid in determining design speeds to ensure rate and throughput requirements can be met by the system.

In summary, conveyor systems are not only mechanically necessary to automated warehouse and distribution solutions, but they are a critical element in the facility's operational efficiency and ultimately, the company's profitability. Properly selected and designed, these systems can support today's process and operational needs, as well as expand, grow and adapt to meet future expectations.

For a company to realize the maximum benefits and return on investment from such a purchase, conveyor systems should be planned for and considered early in the process planning cycle, evaluated as an investment in productivity and operating efficiency, and selected on the basis of real, strategic value.

ABout the author: Craig A. Bertorello is Vice President of Operations at TriFactor, LLC, a Florida-based material handling systems integrator (www.trifactor.com). He has been with the company since 1993 and holds a BS degree in Industrial Engineering from the University of South Florida. Contact him at 863-577-2263, or cbertorello@trifactor.com For more information, visit www.trifactor.com