white paper

Sorting Out Sortation

Where and Why Automated Sortation Is Applied

We Optimize Your Supply Chain | DEMATIC

Sorting Out Sortation

Introduction

With increasing labor costs and supply chain pressures for faster and more accurate and responsive operations, automated sortation systems are finding their way into more and more supply chains, delivering productivity, throughput capacity, accuracy, and accountability for businesses, and a cost effective and efficient flow of goods to consumers.

Anyone who has received a parcel delivery, purchased grocery items from a supermarket or ordered a book or DVD online, you will have come into contact with goods that have been handled by an automated sortation system at some stage. And this may have occurred multiple times as the goods made their way through the supply chain to your doorstep.

Within the supply chain, there are a number of points where sortation is particularly relevant and applicable.

Manufacturing

Manufacturers sort by product to feed robotic palletizing cells

Looking at the upstream end of the supply chain, manufacturers of many fast moving consumer goods (FMCG) use sortation systems to handle cartonized products as they come off the production line. Robotic systems are commonly used to automate the process of palletizing and high capacity sorters are used in conjunction with these to sort the cartons by product type for palletizing and/or to distribute the workload to multiple palletizing cells.

Given the volumes that many manufacturers handle, performing this function manually is virtually an impossible task. From soft drinks to biscuits to toilet paper, many of the products we use and enjoy every day have been sorted before they have even left the production plant.

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Retail Distribution

High throughput sortation systems are used by retailers to distribute goods to stores

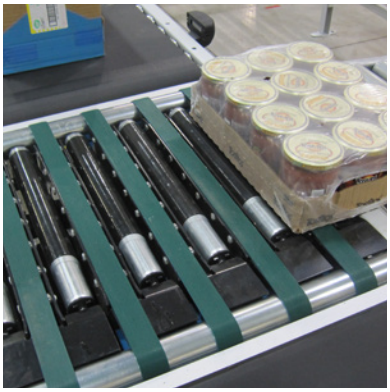
High throughput sortation systems have been used for decades by virtually all of the world's leading retailers. Some of the most sophisticated sortation systems are used day-in, day-out to distribute goods to stores at the lowest cost per carton.

Batch picking has long been employed in the grocery and general merchandise industry to improve productivity and accuracy. Instead of travelling around a distribution center (DC) to pick cartons for a single store, operators perform order picking for a group of stores.

Picking orders for stores in batches increases both the product hit density as well as operators' picks per hit. This system, combined with cartons being loaded directly onto a conveying system at the pick face, allows picking rates from 500 up to 1,000 cartons per hour to be achieved.

While picking the requirements for a group of stores together brings excellent picker productivity, there is a need for a downstream process to "un-mix" the cartons and sort them out to their destination store and hence the need for sortation systems as an integral part of this process.

In more recent times, however, a number of important things have happened with retail supply chains. Improved information flow and integration of IT systems has led to an increase in responsiveness and enabled retail DCs to significantly reduce their inventory by receiving and dispatching goods just in time.



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Cross-docking and Flow Through handling processes are both adopted, with the use of sortation systems to distribute cartons to stores when they arrive at a DC. Some retailers handle up to 90% of their goods in this way, driving their facilities to near stockless operations and cutting out the handling steps of put-away, replenishment and picking.

The sortation system is not only used for distributing goods to stores, but also in accounting for what has been received and where it has been directed.

With an increasing volume of products sourced from offshore, many retailers are engaging consolidators in the source country to gather goods together from multiple local suppliers and pack them into a container as densely as possible for shipping efficiency. In the destination country, the containers are unpacked and an automated system is used to sort them to store resulting in lower distribution costs.

Order Fulfilment

Automated sortation systems have been used in a number of applications for order fulfilment. From pharmaceuticals to electronics to heath and beauty, sorters are used in conjunction with a picking system to direct shipping containers to a lane associated with a delivery route, geographical area or delivery provider.

In the customer direct industry, there are a number of solutions that utilize the same sorter to sort a shipping container to a sort destination, sorting products such as clothes, cosmetics and CDs into the shipper, and then finally sorting the shipper to a destination assigned to a delivery route.

This takes advantage of technologies capable of reliably handling items ranging in sizes from as small as a greeting card to as big as travel luggage. The combination of intelligent order fulfilment and leading edge sortation mechatronics has resulted in minimum touch processing and lower operating costs.

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Parcel & Freight

Many goods are often handled in one or more parcel and freight depots as they move through a transport network between two points in the supply chain. High peak volumes at certain times of the day coupled with the fast turnaround times that are essential to achieve service levels mean that throughput capacity, accuracy and product handling flexibility are the order of the day.

For many freight and delivery providers, automated sortation has become a distinct competitive advantage, allowing them to achieve better service levels and forming a barrier to market entry for new players. For some, it is indeed a necessity due to the nature of the volumes to be processed and the limited time available to connect parcels with their outbound plane, truck or van.

Sortation Technologies

Sliding shoe sorter is an example of a linear sorter

There are a wide variety of technologies available and it is essential to understand the criteria for selection to achieve the best logistics result. In general, we can divide the range of sorters into two broad categories – linear and recirculating.

Linear Sorters

Linear or straight line sortation systems are typically the most cost-effective where the number of sortation points required is small to moderate, for instance, 10-50 destinations. Linear sortation systems include a merge subsystem to collect and combine cartons from multiple sources, an induction subsystem, the sorter itself and often a recirculation subsystem to handle any items that could not be diverted to their assigned lane.

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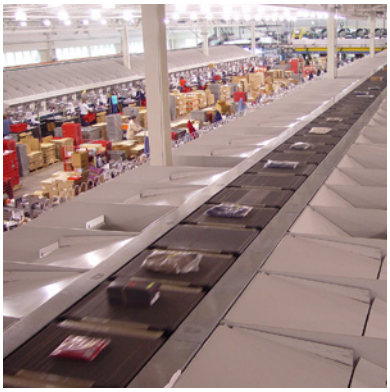
For applications below 5,000 cartons per hour and with a low number of destinations, there are a range of different mechatronics available for performing carton diversion including right angle transfers, pop-up wheel diverters and pivot arm diverters, providing reliable and accurate performance and bi-directional sorting capability.

Where there are applications with higher throughput and/or a moderate number of destinations, a sliding shoe sorter is a more appropriate linear sorter. With this sorter type, cartons are transported on interleaved aluminium slats and diverted by shoes which slide across the slats, guided by an angled track integrated beneath the conveying surface.

Sliding shoe sorters can perform bidirectional sorting and with the latest innovations in sorter and carton induction technology, are able to achieve rates of up to 18,000 cartons per hour with a single sorter.

Recirculating Sorters



Recirculating sorters: more flexible in terms of layout, throughput and expansion options, compared to linear systems

Recirculating or Continuous Loop sorters are comprised of a continuous loop of linked carriers which travel around a circuit. They are becoming increasingly popular in a range of sortation applications, offering significant benefits in terms of throughput, space efficiency, functionality and flexibility.

These sorters can be designed to handle throughputs exceeding 20,000 items per hour and can accurately sort a wide range of products from large parcels down to small loose items to hundreds of delivery points.

Recirculating sorters are generally considered more flexible in terms of layout, throughput and expansion options. They can negotiate turns, incline and decline, utilize carriers multiple times per circuit and be easily expanded with additional induction points and sort lanes with minimum disruption to an existing operation. Their design also features a higher level of redundancy without the same single critical points of failure as a linear system.

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Two general types of recirculating sorters are available – Tilt Tray and Cross-Belt. The Tilt Tray sorter has carriers consisting of a shaped tray with a tilting mechanism that tips the tray to offload the parcel. The carriers of a Cross-Belt sorter have an individually motorized belt conveyor which is dynamically controlled to offload parcels with a high level of precision, according to the dimensions and weight of the items. With the additional offloading control, a Cross-Belt sorter can handle a wider variety of sizes and shapes from small items to bulky general merchandise.

Selection Criteria

One of the first factors to consider in sortation is the nature of the goods to be handled. This covers the dimensions, weights, shapes, fragility, packaging, surfaces and materials. Both the selection of the sorter and the design of the chutes and sort lanes will be influenced by the product characteristics.

Throughput is a second key factor in the selection and design of a sortation system. Throughput requirements should account for daily volumes, hourly peaks, seasonality, operational times and forecasted business growth. It should be recognized that the sustained average operational throughput will be substantially less than the sorter's machine capacity as it is affected by a range of variables such as availability of product, workload balance, product dimensions, staffing, supervision and barcode quality.

Besides product and throughput, it is essential to understand the number and nature of the sort destinations. The number of destinations is typically directly related to the number of stores, orders or delivery routes to be serviced. With building and land space becoming increasingly scarce and expensive, optimizing space efficiency and layout flexibility is becoming a significant solution driver.

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While considering these factors alone is not sufficient to design a system and there are many more details to be analysed and evaluated, in general, we can make some rough selection guidelines to help us get into the right area and, at worst, to eliminate some of the many options.

Whatever the scale of the application, the best approach is always to begin with an understanding of the business, the business drivers and goals, and all the operational requirements. With this approach, sortation systems are yet another tool in the logistics practitioner's kit to deliver significant logistics results to their business.

Product Identification

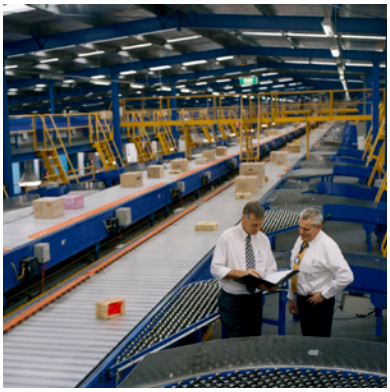
Bar code scan tunnels can read one or multiple sides of cartons and bags on both linear and recirculating sorters

No discussion about sortation systems and their place in the supply chain will be complete without product coding. In order to be able to automatically sort items with speed and accuracy, systems must be able to automatically and accurately identify them.

Product identification is typically a key performance indicator (KPI) in sortation and with "no-read" cartons costing operations in terms of potential errors, additional handling and/or reduced system throughput, this makes reliable identification systems an essential part of sortation systems.

Where there is a dependence on upstream suppliers or manufacturers in the supply chain to provide parcel identification (i.e. barcodes), collaboration and vigilance is required to ensure the potential efficiencies of the automated system are optimised. The initial effort of this for new comers to sortation should not be underestimated.

Barcodes are by far the most common method of item identification and a range of technologies exist to read these with accuracy at high speed. Omni-directional laser scanners have long been used in the industry for reading labels. However, advances in camera technologies have seen this type of barcode reader become increasingly popular, especially for applications with variable barcode quality.



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About Dematic

Dematic is a leading supplier of integrated automated technology, software and services to optimize the supply chain. Dematic employs over 5,000 skilled logistics professionals to serve its customers globally, with engineering centers and manufacturing facilities located across the globe. Dematic has implemented more than 4,500 integrated systems for a customer base that includes small, medium and large companies doing business in a variety of market sectors.

If you are interested in learning more about this topic and how we can help, please contact Dematic at (877) 725-7500 or visit: dematic.com.

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