SORTING OUT YOUR SORTATION OPTIONS

Guiding You Through the Process of Evaluating and Selecting the Right "Mission-critical" Sortation Solution

Honeywell

TABLE OF CONTENTS

1 Sorting out Your Sortation Options

1 Sorting out your application

2 Sorting out Your Handling Requirements

2 Sortation technologies by item type

4 Sorting out Your Rate

5 Throughput rate

6 Sorting out Other Considerations

6 Summary

7 Case Study Example

8 Glossary

SORTING OUT YOUR SORTATION OPTIONS

1

Guiding You Through the Process of Evaluating and Selecting the Right "Mission-critical" Sortation Solution

Whether from growth, consolidation of facilities, mainstreaming of processes, business acquisitions or simply a need to become more efficient, there are several reasons to consider automated sortation solutions. Even if you have a specific solution envisioned, you may want to evaluate several significant factors to be considered when choosing the "mission-critical" solution for your sortation system.

The purpose of this white paper is to guide you through the process of evaluating and selecting the right sortation solution for your facility. Several widely accepted sortation technologies will be examined on a number of aspects that you should consider before deciding on the right fit for your needs. This paper will walk through all of the important factors to consider as you "sort out your options" and ensure that you are making the right decisions for your facility's needs today and years into the future.

SORTING OUT YOUR APPLICATION

Most sorters can be grouped into one of two high-level classifications – line or loop sorters. Line sorters are configured in a straight line, with items entering the sorter at only one location. They typically need separate conveyors for any items that cannot be successfully sorted on the first pass. By contrast, loop sorters are configured in a continuous loop, often with more than one induction point in which items are introduced to the sorter. They also have built-in recirculation, which can help provide more confident, reliable divert confirmation signals from the control system.

One of the first things to consider in a new sortation application is the nature of the operation. Some applications, such as sorting to the proper shipping truck, are best suited to a solution that can efficiently accommodate the destination locations, like a sliding shoe sorter. Other applications, like order consolidation, are conducive to a system that can efficiently sort to a large number of destinations that do not occupy much space, such as a cross-belt sorter.

SORTING OUT YOUR HANDLING REQUIREMENTS

2

One set of factors that have a significant influence on MHE technology selection are the physical features of the items to be sorted, including the types of items and their packaging. Items, for the purpose of this paper, are the individual products, units, cartons or totes that will be sorted. Not all sortation technology is ideal for all types of items.

Overall, there are several factors to consider, including:

1. **Types of items to be sorted** (corrugated carton, tote, polybags, bubble mailers, loose items, etc.)
2. **Item packaging type** (corrugate, shrink wrap case, bagged apparel, apparel on hangers, etc.)
3. **Item diversity** (50 percent corrugated carton, 25 percent bagged apparel, etc.)
4. **Item structural integrity** (how rigid and predictable the structure of the items is)

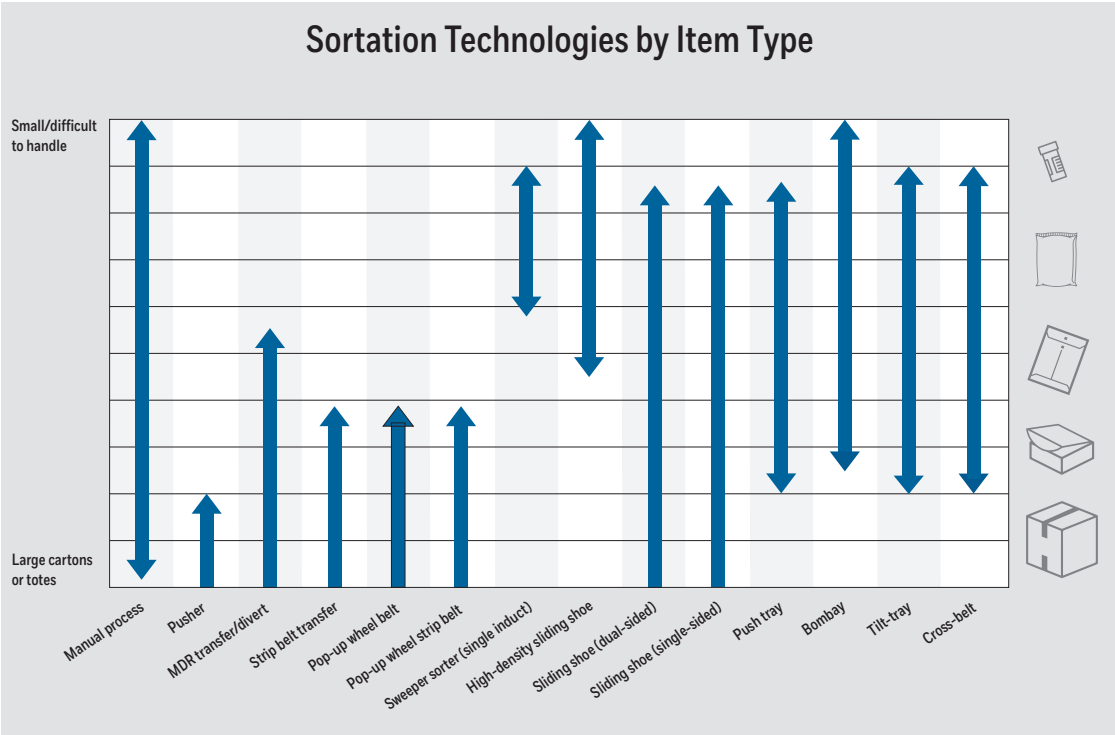


Figure A - *The chart above represents typical "best fit" practices when it comes to matching the best technology with varying item types.*

Keeping in mind that most applications do not handle a single item type, it is important to recognize that a system must accommodate a wide range of item types. The more item types the system can handle, the fewer non-conveyables there will be, increasing facility efficiency and shortening the payback of the investment. Therefore, when making your selection, take into account your entire product mix for present and future needs.

Aspects such as size, weight, balance or shape of product to be sorted may rule out certain sortation technologies. Packaging integrity of the items, such as "perfect presentation" needs and durability concerns due to reproduced packaging, must also be considered.

Note: for complete definitions of the technologies mentioned in this paper, please see the Glossary at the end of this paper.

Bombay

SORTING OUT YOUR RATE

3

Another critical factor to consider is the rate requirement of the system.

For the purpose of this paper, "rate" relates to the item throughput per hour, or the rate at which the system must operate. In the material handling industry, this is also expressed in terms of cartons per hour (cph) or pieces per hour (pph).

A common misunderstanding about rates is that "speed" (or how fast the equipment runs) is the same as throughput. However, concentration on speed alone can steer your selection in the wrong direction. Speed, without consideration of other factors such as gapping, gentle handling and accuracy, can actually be an inefficient use of the technology.

Instead, as systems have been pushed to continually increase rates, MHE vendors have worked to increase throughput without increasing machine speed.

High-density sliding shoe

Push tray

This reduces wear, energy usage and noise while extending equipment life. It also makes the machine control system much more critical on sliding shoe and pop-up wheel sorting technologies. An increased rate at reduced speeds requires reducing gaps between items while maintaining divert accuracy.

In sortation equipment, as rate and handling capabilities increase, so does the cost of the technology. System implementation payback must be carefully balanced with rate to meet an acceptable budget for any project.

Some rate requirements may immediately rule out certain sortation technologies. Actual rates are highly dependent on a number of factors, but Figure B will help in learning the most common rates by technology.

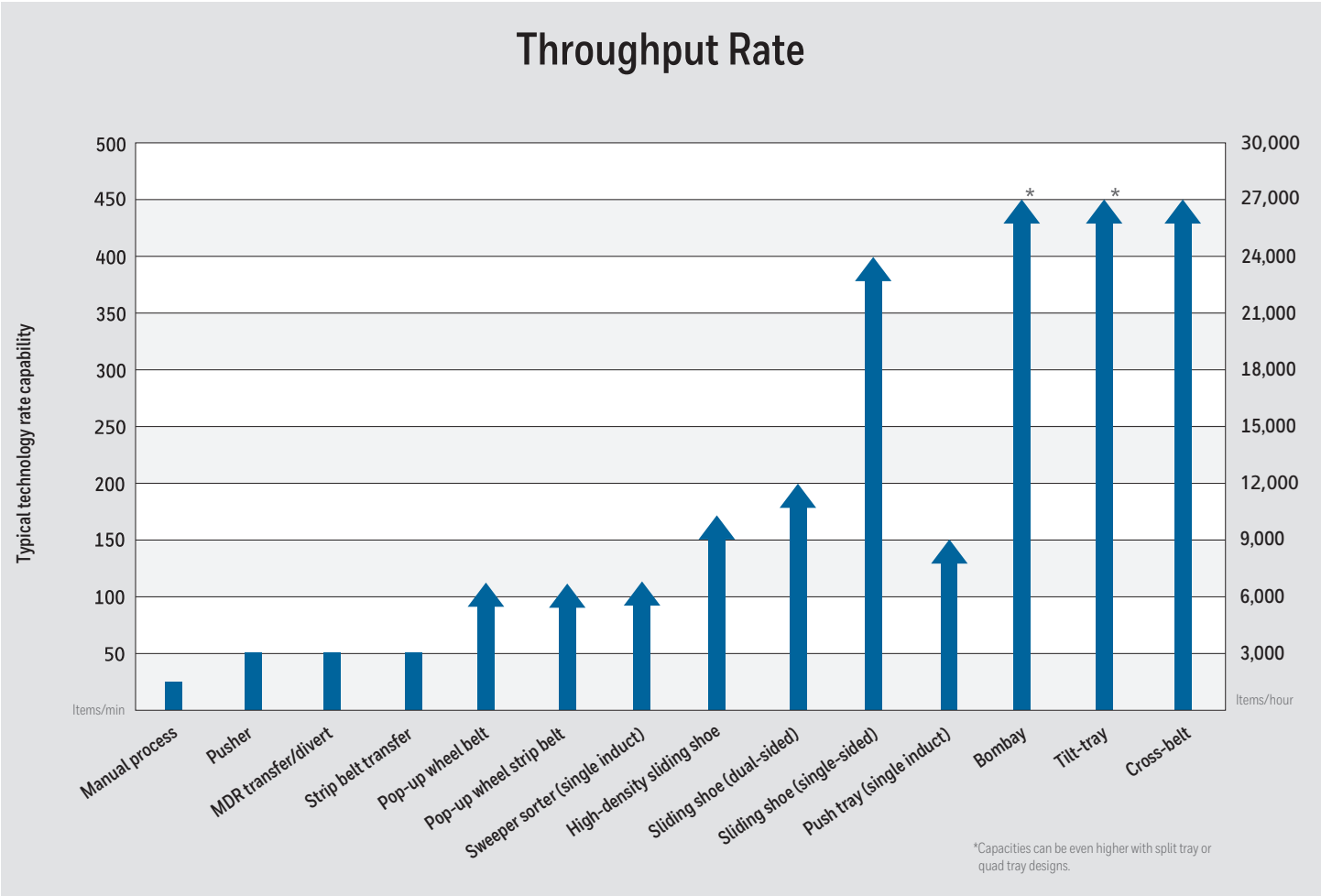


Figure B – *The chart above represents typical "rules of thumb" rates by sortation technology. These rates assume average item sizes.*

SORTING OUT OTHER CONSIDERATIONS

4

In addition to handling, rate and application requirements, several other factors can make a big impact on the technology decision.

Floor space requirements – Many facilities are looking to add e-commerce-focused solutions in existing buildings, sometimes even in the back rooms of retail stores. Some technologies are designed to maximize the number of destinations in a very small footprint.

Operating noise levels – Some sortation equipment operates at very low noise levels while maintaining very high rates, increasing ergonomic comfort while still maintaining throughput.

Investment level – While some sortation systems require more substantial technologies and supporting subsystems, they can better prepare the operation for future growth.

Energy usage – Energy usage is becoming an increasingly important aspect of the material handling system. If energy usage is an important factor in your enterprise, be sure to share this concern with your MHE vendor at the project outset, as energy usage can vary widely by technology and vendor.

Maintenance and operator skill levels – Both the daily operation and maintenance tasks can vary widely by technology and by MHE vendor. Consider how your personnel will interact with the equipment and how your current staff will be able to maintain the system.

Future expansion – If there is a possibility for future expansion, this should be taken under consideration at the project outset. The ability of future expansion, in terms of rate or divert locations, can be limited by the technology or by the initial system design.

Divert accuracy – Divert accuracy and propensity for jams, hang-ups and mechanical problems can often be dependent on the specific design details by the MHE vendor and the gapping requirements designed for the system.

Divert confirmation – Confirming a divert can be a necessary step in some sortation processes. The method for confirming a divert varies by the sortation technology and the machine control software used by the MHE vendor.

Depreciation schedule – Some sortation technologies may have a longer expected life span, which will affect the depreciation schedule. This must be clearly understood before making the purchase so project costs are properly distributed.

SUMMARY

This paper has discussed critical factors to evaluate during a typical automated sortation investigation – but there are also several details which can only be learned through experience. Before construction plans begin, be sure to talk to an MHE vendor with significant, unbiased experience in a wide variety of sortation technologies. This will ensure the best possible, cost-effective solution is developed prior to submitting a budget for capital approval.

CASE STUDY EXAMPLE

5

Now that we have discussed several factors that go into choosing the right sortation technology, we can look at a real-world example to see how all the factors must be considered to make the right decisions.

A retailer has multiple regional distribution centers, handling mostly corrugated cardboard boxes, with the need to serve several thousand retail stores. In this particular situation, it made sense to install two types of sorters in each of its regional distribution centers – a tilt-tray sorter for order fulfillment and a sliding shoe sorter for routing cartons throughout the facility and shipping.

FACTORS CONSIDERED IN THE SELECTION OF THE TILT-TRAY SORTER:

- Items would be consolidated as necessary to fulfill orders for retail stores.
- The sorter needed the ability to handle more than 20,000 items per hour in the future.
- The sorter needed to have a noise level under 80 dBA because of the proximity to employees.
- The sorter needed to have the ability to gently handle boxes of product with loose lids.
- The sorter would be fed from two decasing areas where individual items would be removed from cartons and placed onto load belts. The two decasing areas were located half-way around the tilt-tray loop from each other in order to maximize sorter capacity.

Solution: For each regional distribution center, a tilt-tray sorter was used to sort orders to over 700 order filling destinations at a rate of more than 15,000 items per hour.

FACTORS CONSIDERED IN THE SELECTION OF THE SLIDING SHOE SORTER:

- The sorter needed to span over 600 feet in total length and route product to shipping dock doors and other areas of the building.
- The sorter required the ability to handle more than 8,000 items per hour in the future with seven additional divert lanes.
- The sort locations needed the ability to buffer 50 feet of orders as it is being hand-loaded into a truck.
- The sorter would be fed from six different areas of the facility.
- The sorter needed the ability to handle corrugated cartons with an average length of 27 inches and an average weight of 30 lbs.

Solution: For each regional distribution center, sliding shoe sorters were used to sort orders to 26 or more shipping destinations and four or more routing destinations at a rate of over 7,000 items per hour.

Using a tilt-tray sorter for order fulfillment and a sliding shoe sorter for shipping and routing items throughout the building allowed the retailer to achieve the following operational objectives:

- Improved associate productivity
- Increased order accuracy
- Compressed fulfillment cycle
- Improved store service levels
- Provided DC network redundancy
- Obtained and/or surpassed the projected ROI

GLOSSARY

6

Sorting out Your Options

The summaries below will help further explain the basic sortation technologies available and typical specifications.

Pop-up Wheel in Belt: Pop-up wheels or rollers embedded in a belt conveyor lift and transfer items at an angle to a downstream conveyor. This technology requires a relatively low capital investment and provides medium sortation rates, but does not provide a positive divert, which limits its use to certain item types.

Pop-up Wheel in Strip Belt: Pop-up wheels or rollers embedded in a strip belt conveyor lift and transfer items at an angle to an aftersort conveyor. Unlike the pop-up wheel in belt sorter, this technology keeps items in constant contact of the carrying surface until they are diverted, maintaining gaps across a machine with a high quantity of divert points.

Tilt-tray: Trays mounted to carts running on a continuous-loop conveyor "tilt" and transfer items down into a chute when an item reaches its sorting destination. Items are inducted either manually or automatically onto the trays via induction stations at multiple locations throughout the loop. The technology is ideal for applications that require a high number of sort locations, and it allows for easy future expansion. Low noise levels also make the tilt-tray sorter a good solution for operators who work within close proximity to the machine.

MDR Divert/Transfer: Pop-up wheels or transfer bands embedded in a motor-driven roller (MDR) conveyor re-direct items to a downstream conveyor. A relatively simple and safe sortation option, MDR diverts or transfers are good for products requiring zero-contact accumulation. MDR systems usually achieve the best payback when there is a high concentration of divert and merge operations in a small footprint. Since MDR systems typically handle one item per zone, sortation rates can be limited.

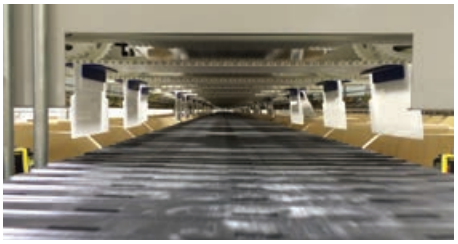
Sliding Shoe: Diverting "shoes" attached to the conveyor surface positively divert items onto an aftersort conveyor. Fed by a single stream of products merged from multiple areas of a building upstream, sliding shoe sorters are a popular choice for shipping sorters, as they can provide high rates with predictable divert accuracy for a wide range of items.

Cross-belt: Motorized belt conveyors are mounted to carts running on a continuous loop conveyor and transfer items down into a chute when an item reaches its sorting destination. Cross-belt technology has similar functionality and features to the tilt-tray sorter. The belt can provide more predictable divert reliability with certain types of items.

Sweeper: Paddles "sweep" items off a modular belt into bins located on either side. Good for applications with high-density destinations and small e-commerce orders.

Bombay: Items are dropped into bays which run around a continuous loop. Doors open from the bottom to allow items to fall into bins located below. Good solution for apparel and circular items that can roll.

Push Tray: Items are inducted onto carts running around a continuous loop, before being pushed off by a sliding bar. This technology combines the benefits of sliding shoe and tilt-tray sorters.



Honeywell
Honeywell House, Skimped Hill Lane
Bracknell, Berkshire
RG12 1EB United Kingdom
+01344 656000
info@intelligrated.com
sps.honeywell.com

SOYWP (EN/A4) | 12/20
© 2020 Honeywell International Inc.

THE
FUTURE
IS
WHAT
WE
MAKE IT

Honeywell