TECHNICAL NOTES
VASAN015

Managing Sorters Continuous Double-Sort Operation

Batch picking orders is an efficient way to reduce walking in a distribution center. Piece sorters (tilt tray, cross belt, bombay) allow maximizing the number of orders to pick as a batch. Unfortunately, piece sorters are very expensive devices. The larger the number of orders to batch with a piece sorter, the longer the sorter has to be, and the more expensive it gets.

Double sortation is an approach that allows piece sorters to increase the number of orders to batch without requiring the single sortation length.

Conventional Double Sort Process

Sorter prices have a strong linear dependency on the sorter length. The chute section of a sorter is normally its longest section.

In a conventional single sort process, a sorter chute is required for each order in the batch to pick. A system designed for 1,000-order batches needs to have 1,000 chutes. At 3 ft. of sorter for each couple of chutes, the chute section of the sorter is 1,500 ft. long.

If a double sort process were used items are first sorted into waves and the then each wave is sorted into orders. The total number of sorter destinations could be reduced to as few as 68: 34 for the initial wave sort and 34 for the secondary order sort. There are other configurations of sorter destinations; however, the closer the primary and secondary sorts have equal number of destinations the fewer total sorter destinations are required.

Let us consider a system for 10 waves of 100 orders each, not as optimum as the one with the 34/34 configuration, but easier to visualize. The sorter needs 100 order chutes and 10 wave chutes. If wave chutes were 5 ft. of sorter for each couple of chutes, the chute section of the sorter would be only 175 ft. So, for the same number of orders to pick as a batch, the required chute section of the sorter using double sortation is less than 12% of the chute section using single sortation.

Normally the 1,000 orders are picked together are called a pick wave, their section of the sorter is called wave sorter. The 100 orders sorted together by the presort process are called a pack wave and their sorter section is called order sorter.

The extra handling of items required in a double sort process is easily justified with the savings on the sorter cost. However, the number of waves to process is rather large. In a traditional sorter process with static waves (next wave does not start until previous wave is fully completed) the inefficient wave transition periods can add up to large reductions in capacity and productivity with long periods of empty trays and idle inductors. What's more, the transition period is largely independent of the actual size of the pick wave. Small pick waves take nearly the same time to finish the final few units, as do large pick waves.

Continuous Double Sort Process

The ideal solution for wave transition issues is a waveless process. Instead of static pick waves, the system can keep adding dynamically batches of 100 orders to the pickers' tasks as wave sorter chutes are completing. The new orders are sorted to the chute that just completed. Pickers and inductors do not need to wait at the end of a pick wave for the next wave to start. The long periods with empty sorter trays are eliminated. Picking batches are larger as pickers are continuously picking for 1,000 orders. Utilizing the idle times of the sorter and the workers can increase capacity/productivity by up to 30%.

Real-time RF-directed picking is the best scenario for implementing waveless picking processes. In applications that require labeling of the sorted items, RF picking is still feasible if the label can be done at the packing stations.

Quasi-Continuous Double Sort Process

Due to labeling requirements, some applications do not allow the implementation of a complete waveless process. However, if label generation is dynamic and is printed at multiple stations along the pick path and completed pick assignments can be dropped off at these points a quasi-continuous waveless process is possible.

Some operations may require well defined pick waves and dynamically created pack waves are not an option. Such operations can also have continuous waveless presort operations by

utilizing only half of the wave sorter destinations for each pick wave. Wave sort uses alternate destinations every other pick wave. The negative effect of this approach is the reduction of the pick wave size by half. Often, people try to alleviate this disadvantage using more than half of the chutes, hoping that some of them will be completed by the start of the next wave. The mathematics of probability quickly dispels any such hope.

In most operations there is flexibility regarding specifically what orders go to each pack wave. Taking advantage of software that supports dynamic chute allocation, it is possible to create a continuous presort operation where there are no wave transition periods and where pick waves actually have a proportionally longer time to complete. This technique takes advantage of the fact that not all the wave sort destinations are required from the beginning of a new pick wave.

Continuous waveless processing of the order sort process is also possible using similar techniques through the use of dynamic optimization. Double sort operations may be truly become waveless operations.

Conclusion

Double sort processing is an excellent approach to get the benefits of large picking batches without having to pay the full price of the required sortation equipment to support it. Double sort processing can be enhanced further with software that can support non-conventional operations.