Next Generation of High-Speed Goods-to-Person Picking Solutions Optimize Flexibility and Throughput

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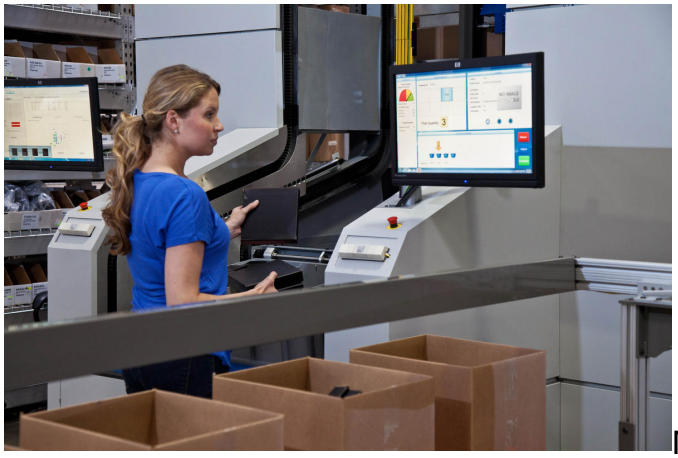


Many executives running high-throughput distribution centers face a growing logistics challenge – the need to prepare small-quantity, mixed-SKU orders to ship and arrive on schedule with short delivery times. Fueled by shifting demographics, niche retailing, new channel formats like mobile devices, faster product introductions and shorter product life-cycles, small-quantity, multiple-SKU orders are becoming increasingly difficult to handle with conventional manual and automated storage and pick systems. Sometimes comprising thousands or tens-of-thousands of different SKUs and in an assortment of packaging styles, a DC’s inventory needs to be stored, picked and shipped with a very high level of efficiency to optimize labor usage and minimize operational costs.

Much of the recent investment in automation for warehouses and distribution centers has been driven by a desire to improve single-piece order picking processes. For high-volume pick order lines, highly automated robotic- and shuttle-based systems provide efficient goods-to-person solutions. These systems can achieve performance levels of many hundreds of order lines per hour with precision accuracy, while operating in highly condensed space parameters.

But as distribution requirements continue to evolve, so have the needs of distribution executives, who are increasingly requiring more flexibility, better uptime reliability and improved energy efficiency from their high-throughput goods-to-person picking operations – qualities that most conventional systems fail to fully achieve.

New Generation of High-Throughput, Goods-to-Person Picking

These criteria have now been realized, however, with the emergence of a new generation of high-throughput picking solutions which deliver an improved level of flexibility, system uptime reliability and energy efficiency. One such new-generation system that embodies these features is Perfect Pick, recently introduced by the Material Handling division of OPEX Corporation, a world leader in high-speed automated systems for sortation of small packages, mail and documents. Perfect Pick operation is based on the company's highly successful, patented Mail Matrix® technology, which was initially released in 2007.

On the surface, Perfect Pick appears similar to other automated goods-to-person systems: A highly scalable, high-density tote racking structure serviced by delivery vehicles which extract totes from storage locations and present them to pick stations for order fulfillment. But that is where the similarity ends. A closer view demonstrates that Perfect Pick is quite different from any other automated goods-to-person option, a uniqueness that permits it to operate at a higher level of throughput performance and system efficiency.

One-Touch Throughput – This unique piece-picking solution was engineered to eliminate the complexity associated with every other goods-to-person technology. Perfect Pick is a double-ended picking solution that requires no elevators, conveyors or transfers. It delivers the tote directly from the rack location to the picking station, without the tote leaving the delivery vehicle.

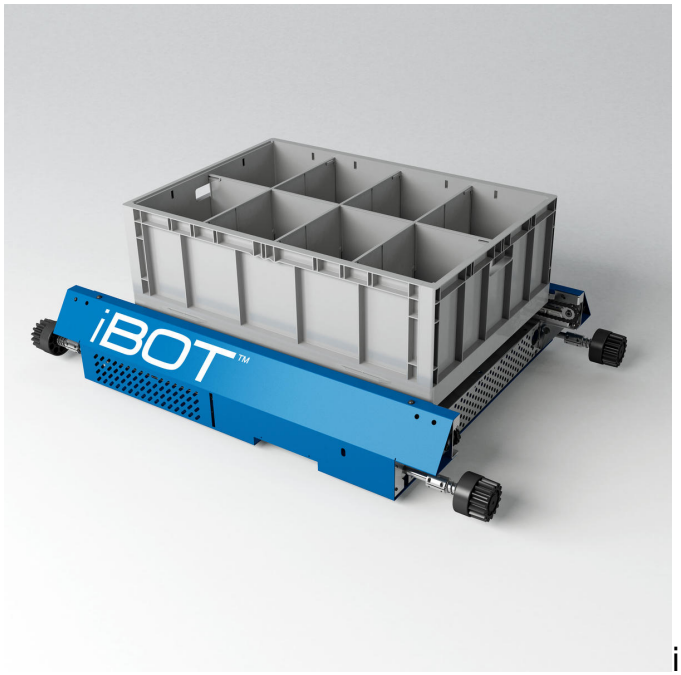
Think about traditional shuttle picking technology. The shuttle moves down the aisle to a rack location and picks up a tote, pulls it onboard, then again moves down to the end of the aisle where it interfaces to a lift. Here the shuttle is either transported down, or it passes off the tote to be transported down to a lower level where the tote is again transferred off to a conveyor loop, which stages the tote to a picking station. After picking, the tote is then lifted up, transferred over and set back down on another conveyor and sent back into the system. That is one pick cycle. That multi-touch process is repeated hundreds of times per hour with conventional automated shuttle pick systems.

A similar approach is used with robotic pick systems which are required to lift bins vertically to access the desired tote. The selected tote must then be transported to a drop location where the tote is lowered to a pick station. When picking is complete, the tote is elevated back up to a receipt location where a robot transports it back to the bin location where it originated. The robot then must drop the tote into the desired bin.

Use of transfers, lifts and conveyors adds complexity to any automated goods-to-person system, which increases the possibility of slow-downs and downtime. Simplicity of process operation is fundamental to minimizing breakdowns, wear and maintenance requirements, which ultimately means a higher probability of system uptime, and subsequent increased throughput, with lower operating costs. The design of Perfect Pick demonstrates this objective by achieving an industry-leading throughput rate of up to 1,000 picking cycles (picking and putting) per hour without the need for elevators, conveyors or transfers.

iBOTs Access 100 Percent of Inventory within Aisles – Central to the performance capability of Perfect Pick is its patented iBOT delivery technology. iBOTs are intelligent, wireless vehicles that store and retrieve totes within the system's racking structure.

A key feature of the system is the capability of each iBOT to access 100 percent of inventory in the aisle. This differs from all conventional shuttle-based goods-to-person systems where each individual shuttle is held captive to a specific row, inhibiting that shuttle's full access to all SKU locations within the aisle.



iBOTs are free to roam horizontally or vertically throughout the aisle to reach designated SKU/tote locations and pick stations. Perfect Pick's traffic control software, operating in real-time with microspeed response, monitors the position of all iBOTs and directs their movements throughout the system for maximum accuracy and efficiency.

The iBOTs operate on four-wheel-drive, geared-engagement movement, which

creates a positive connection to better facilitate faster acceleration and deceleration throughout the system. A simple bar-extractor utility is used to engage, retrieve and replace totes. Each iBOT has a load capacity of 60 pounds.

When an iBOT carrying a tote is received at a pick station, the iBOT tilts for ergonomic positioning to reduce stretching or lifting on the part of the operator. Text and visual prompts on picking monitors, supported by pick-to-light, direct the operator to choose the required item(s) from the tote, and indicate where to place them into the appropriate order boxes. When the operator indicates the final pick is complete, the software releases the current iBOT and tote, which then returns the tote to its location in the racking structure. The next iBOT/tote is immediately placed into position for the next picking sequence.

The flexible iBOTs provide the ability to pick and replenish simultaneously, and on the fly, as needed.

Depending on SKU counts, throughput volume requirements and number of pick stations, up to 16 iBOTs could be deployed per aisle, with each iBOT having access to 100 percent of the aisle inventory. iBOTs can be added or removed from the system within a matter of minutes, offering a level of flexibility not previously available in goods-to-person systems.

Energy Efficiency – The importance of energy efficiency increases as energy costs continue to escalate and as distribution operations are increasingly being pressured to lower operating costs without losing productivity. Continuous improvements in energy-efficient technology for warehouse facilities have become a growing issue of focus. This can present a challenge for distribution executives when assessing automated goods-to-person solutions.

All operational parts within an automated pick system utilize energy. Aside from the movement of the shuttles themselves, employing the use of lifts, transfers and conveyors to move shuttles and totes throughout the system can present a significant draw on energy.

Simplicity of process operation in automated picking is key for reducing energy usage. Reduce the volume of moving components and the need for consumption of energy diminishes. This simplicity of functional efficiency is embodied in this new generation of automated picking solutions. The Perfect Pick system, for example, which, because it is designed without the use of lifts, transfers or internal conveyors, does not require the added energy draw from such components to provide throughput.

The energy required to power vehicles that are moving totes throughout an automated goods-to-person-system represents the bulk of the energy consumed. Some automated pick systems have moved to utilize rechargeable batteries to power or partially power shuttles and robots as a method to offset energy usage. Batteries depend on chemical activity to generate electricity. Not only do batteries require downtime to recharge, but the chemical activity eventually depletes requiring battery replacement. On systems where many shuttles or robots are

running, the cost of battery replacement can be significant and needs to be factored into maintenance and operating costs.

More energy efficient high-speed pick systems are moving to ultra-capacitors. Unlike batteries, ultra-capacitors store energy electrostatically. They are designed with a high cycle life of 5 to 10 years without the need for frequent replacement associated with battery power. They do not degrade like batteries, and can be used for literally millions of cycles.

Perfect Pick is one system that utilizes ultra-capacitors to power its iBOTs. The iBOTs are equipped with energy recuperation modules that utilize the onboard ultra-capacitors to recapture energy during normal operation of deceleration and descent. The ultra-capacitors can store relatively large amounts of electric charge very rapidly. They are also capable of delivering very large bursts of power in a highly efficient manner.

System Scalability – When assessing a goods-to-person system, distribution executives need to keenly consider expanding SKU counts, fluctuations in throughput volume of existing SKUs, and potential reduction of SKUs counts. Seasonal influences, and the rise and fall of the popularity of items offered on the Internet, necessitate the need for highly flexible scalability in a goods-to-person automated system. But few systems are designed for a quick and easy scalability to these changing conditions.

A key capability of the Perfect Pick solution is that it provides exceptional flexibility in system scalability, and can be adapted and expanded as needed. The system can easily be extended or contracted, if future needs warrant. A single aisle can be easily expanded by adding modules. Additional aisles and picking stations can be seamlessly integrated into the operation.

An exceptionally unique aspect of this system, from a scalability perspective, is its ability to quickly and easily increase or decrease the number of iBOTs to adapt to changes in throughput. Perfect Pick allows from 1 to 16 iBOTs to be operating within an aisle at any given time to accommodate throughput requirements. Because iBOTs operate independently from the racking system, they can be introduced or removed in a matter of minutes – allowing a DC to quickly and easily adapt throughput rates to ever-changing business demands and cycles.

New Benchmark for Throughput Efficiency

With the emergence of new-generation, high-speed goods-to-person picking technology, as exemplified in Perfect Pick, a new level of flexibility, better uptime reliability and improved energy efficiency can now be achieved above and beyond the capabilities of conventional goods-to-person pick systems. Fast, efficient and accurate delivery is one of the strongest competitive advantages in any market, and super-streamlined, goods-to-person piece-picking provides a critical foundation for achieving this.

These new systems enable a truly optimized capability for high-throughput DCs that

handle a high volume of small-order picking. There is no question but that this technology is destined to set a new benchmark for improving the efficiency within these distribution operations.

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