BY DAVID MALONEY, SPECIAL PROJECTS EDITOR

the Innovative Eight

Here are eight of the best new picking technologies you've probably never heard of. Go ahead, take your pick.

THOUGH THEY MAY NOT BE AWARE OF IT, DCs LOOKING TO AUTOMATE THEIR order-picking operations have never had more options. In recent years, designers have been crowding into the market with inventive, yet cost-effective, new systems.

What follows are eight examples of those innovative new order fulfillment technologies. They range from the radically different to new twists on tried-and-true technologies. One system uses a fleet of wheeled robots to whisk items to workers. Another—a pick-to-light system—replaces hard wiring and illuminated beacons with low-cost laser lights and stick-on reflectors. Still another combines existing technologies—voice, lights and bar-code scanning—in ways never before envisioned.

Though you may not be familiar with them now, you'll likely be hearing a lot more about these systems in the future. Without further ado, we introduce our Innovative Eight.

1 These bots are made for walking

Imagine what your order pickers could accomplish if they didn't have to run all over the DC to retrieve items. Or stand around waiting for conveyors to deliver them. You no longer have to rely on your imagination for the answer. A radical new picking system from Massachusetts startup Kiva Systems eliminates the need for workers to travel or wait for items. With Kiva's system, robots deliver a constant stream of items to stationary warehouse workers at what the company terms "walking speed"—about three feet per second.

With Kiva's Mobile Fulfillment Solution, products are stored on small sets of shelves known as inventory pods. When a particular SKU is needed, the software dispatches a small wheeled robot to the inventory pod. Upon arrival, the bot moves under the pod, gently raises it just enough to move it, and carries it to a picking area known as the inventory station. Here, a worker selects items from slots in the pod and scans each one to verify the pick. (The system can also be configured to accommodate voice-directed picking or picking directed by a laser light.)

When the worker is finished with a particular pod, the robot, guided by optical markers placed on the floor, takes it back to storage. But it doesn't necessarily return the pod to its original spot. The system's software (which keeps track of all items in the facility) incorporates optimization tools that allow it to re-slot products constantly according to their pick frequencies. "If red T-shirts become suddenly popular for picking," says Mick Mountz, the company's founder and CEO, "those pods would then move closer to the front of the building."

The inventory pods, which are three feet square and stand six feet high, hold three to seven shelves, depending on the size of the SKUs. A single pod may contain anywhere from 20 to 120 SKUs, which are accessible from all four sides to allow for very dense storage. Groups of items that are commonly picked together are typically stored on the same pod to expedite picking.

The pods can be stored at floor level or, through use of vertical lifts, on mezzanines or upper levels, allowing companies to reconfigure their DCs as needed. The system is also highly scalable. As business grows, companies can simply add pods, stations and robots.

A typical system requires anywhere from five to 10 robots per picker, depending on throughput and products selected. While one robot positions an inventory pod for picking, other robots can be busy gathering pods containing additional products or returning pods to storage positions. In a typical application, a worker is presented with a new pick face approximately every six seconds, which translates to a picking speed of 600 lines per hour.

Kiva calls the Mobile Fulfillment System an economical alternative to automated storage and retrieval systems, with both lower capital and operating costs. The company says it's versatile as well: the same stations used for picking can also be used for replenishment, with workers loading products into the inventory pods rather than picking from them. (www.kivasystems.com)

2 The ever-changing face of picking

There are plenty of picking systems designed for fast-moving items. But what about items that aren't ordered frequently enough to merit dedicated pick slots? It turns out there's a system for those items too: the Dynamic Picking System (DPS) from Witron. Suitable for use with small products (like health and beauty aids, pharmaceuticals and parts), the DPS is a highly automated system that combines a traditional mini-load with pick-to-light technology. What makes this system innovative is that it presents an ever-changing pick face to the order selector.

With the DPS, products are stored in totes in a large mini-load automated system until needed. When it comes time to pick them, retrieval cranes gather the totes and take them to the pick faces, which consist of long rows of racks, similar to flow racks in a pick module. But unlike flow racks, the totes in this system are only deposited at the pick face until products are picked. After that, the system retrieves them and sends them back to storage in the mini-load.

Sophisticated software determines which totes to present to workers at individual pick slots. "The system organizes the product totes by delivery time, batching together orders that have similar items," explains Brian Sherman, Witron's manager of business development.

Hundreds of totes can be presented at any given time in the large system, with workers assigned to small zones for picking. Those zones are designed to extend no more than eight feet from either side of a processing station located within the racks. Other totes for gathering orders are automatically delivered to the processing stations, which also contain a computer and a fixed scanner, similar to scanners found at supermarket checkout lanes.

Once an arriving order tote has been scanned, beacons and quantity indicators attached to the pick face light up to indicate which SKUs should be picked into the order tote. The worker pulls the needed items from the product totes in the pick faces and carries them a few steps to the order tote. As each item is placed into the tote, it passes the fixed scanner, which verifies that the proper item has been selected. The system also allows continuous monitoring of worker performance. Pick rates vary by SKU and size, but a typical worker can select about 600 items per hour.

The advantage of this system is that it enables dynamic picking. Products are re-slotted at the pick faces continuously as the totes containing them enter the area, picks are made and the totes return to storage in the mini-load. The system is also highly scalable. Because there's no need to add pick faces as the number of SKUs increases, growth is limited only by the size of the mini-load storage. The system also organizes like items that can be picked together close to each other to reduce walking time. (www.witron.com)

3 A truly hands-on approach

A variation on the Dynamic Picking System is Witron's Ergonomic Dynamic Picking System. This model uses the same basic infrastructure as the DPS, but instead of inserting totes of products needed to fill orders into the dynamic pick face, it takes the totes directly to a worker seated at a picking station.

Like the DPS, it uses a mini-load to store totes of products until needed for picking. However, the design is a bit different. The typical module is configured to contain three storage aisles and two picking stations. Cranes in the two outer storage aisles hold products in racks 45 to 60 feet high. When needed, totes are retrieved from these aisles to replenish a 20-foot-high middle aisle that contains a Picking Miniload. This area first holds and then sequences the totes for delivery in precise order to the two picking stations in the module.

Product totes, each containing a single SKU, are presented one at a time to a worker seated at a picking station. An order tote is also presented automatically to the same worker. Each tote is tilted slightly forward to give the worker easy access to its contents. A display screen tells the worker how many items to move from the product tote to the order tote. Since only one SKU is available at a time, it is virtually impossible to make a mistake as long as the worker counts properly. Scanning can also be performed for verification.

Another option for this system uses a light curtain to count the number of items needed for each pick. A small display screen above the totes shows an outlined image of either one or two hands. For example, if five items of an SKU are needed, two hands illuminate on the display telling the worker to move the first two items from the product tote to the order tote. The light curtain detects the motion of the worker's hands moving between the totes and verifies that two items were selected. It then displays another two hands to request that two additional items be moved. When that's done, the display illuminates only one hand to indicate that just one more item should be selected. (www.witron.com)

4 Take the A-Frame

Clearly not one to blindly follow the crowd, Innovative Picking Technologies Inc. (IPTI) has used what's generally considered to be a high-cost technology to create a low-cost version of the A-Frame picking machine. What distinguishes IPTI's Pick-MAX Auto A-Frame from others on the market is that it uses RFID technology, not hard wiring and controls, to control picking. "A-Frames have been around for 50 years. What we wanted to do, though, was to come up with an affordable A-Frame," says Darin Danelski, president of IPTI. He says the solution his company has developed is less than half the cost of traditional A-Frames.

For those not familiar with the A-Frame, it is an automated picking machine used to dispense small items into order totes. The items must be small enough to fit into slots arranged in an A-shaped storage unit. As a tote passes below the unit, an item is automatically discharged into it from the slots above. The system is suitable for use with cosmetics, pharmaceuticals, DVDs and other small products.

In most traditional A-Frame designs, a centralized control system must talk to all of the system's dispensers at the same time, controlling which product is dropped into a given tote at a particular time. This requires extensive wiring and sophisticated controls and software, making these systems expensive to install and operate. What IPTI did was eliminate the central control. Instead, the full list of items that need to be picked into an individual tote is written onto a rewritable RFID tag attached permanently to the tote. In a sense, the RFID tag acts like a shopping list for everything that tote should contain. As the tote passes by a dispenser, an RFID reader reads the tag and sends a signal to the A-Frame telling it which items to dispense.

In addition to eliminating the expense of centralized control, the Pick-MAX Auto allows for greater flexibility. A-Frames are no longer tied to hard wiring. They can be placed anywhere in the system that a conveyor line can feed a tote.

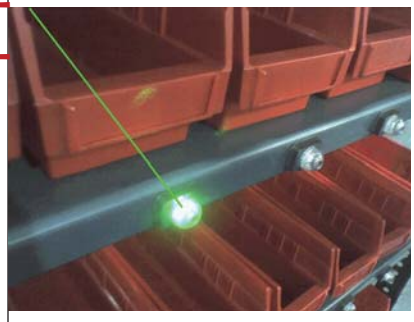
"The only limit is how much you can fit into a tote," says Danelski. The system looks at the cube of each item and then makes certain that when gathered together, the items that are written onto the tag won't exceed the tote's capacity.

The A-Frame in the Pick-MAX Auto accepts items measuring up to 12 by 12 by 3 inches. The dispensing slots are completely adjustable to accept a wide range of products. The slots are manually replenished by workers, with a two-stage light telling them when stock is getting low. A steady light means items will soon run out, while a flashing light indicates that the slot is completely empty. (www.ipti.net)

5 Quite illuminating

The creative minds at IPTI have also been pondering the problem of how to automate picking in low-volume areas at a reasonable cost. What they've come up with is Laser Pick, an economical pick-to-light system.

The system works in much the same way as a traditional pick-to-light system except that instead of hard-wiring lights to rack faces, it uses a laser light to illuminate picking positions. Small stick-on reflectors with parabolic lenses are placed at each position to capture the laser light, giving the appearance of a lit bulb, but at a fraction of the cost. (Each reflector costs about $3.) Eliminating hard wiring also makes it easier to relocate the system to other racking and allows fast re-allocation of the space needed within a zone simply by moving the reflectors and reprogramming the laser.



The laser can be mounted to extend from the top of the racks or from the ceiling. It has the ability to cover 100 feet of rack space (50 feet in each direction). When a pick is needed in a zone, the laser fires its beam at the rack containing the item. The reflector at the shelf location captures the light to indicate where the product is stored. The laser is so precise that it can identify a rack slot down to three-quarters of an inch. The company says this permits much denser storage of small SKUs than is possible with traditional pick-to-light displays, which require a minimum of five to six inches between slots.

Once the location is identified, a quantity indicator attached to the rack tells the worker how many to select. The worker picks the item (or items), then hits a confirm button next to the indicator. Discrepancies can also be entered there. Unlike traditional pick-to-light systems, a single display can serve the entire rack face. An optional system also uses voice technology to relay the order number and the quantity to pick. The worker selects the items, then confirms the action verbally.

The system can be used in reverse as well, functioning as a put-to-light system for sorting, processing returns or accumulating orders. "The Laser Pick system also offers all the advantages of pick-to-light, such as real-time inventory updates, picker accountability, speed and accuracy," adds IPTI's Danelski. (www.ipti.net)

6 Mobile marvel

For DCs that don't want to limit themselves to a single technology, the FoxFetch system lets them have it all. "FoxFetch really represents voice meets lights meets scanning," says Ralph Henderson, vice president of marketing. "We wanted to create an affordable picking solution that was easy to implement using technologies people were accustomed to, but using it where it best makes sense."

The FoxFetch system is a low-cost picking technology for medium movers and items picked in batches that doesn't require a huge investment in hard wiring or material handling equipment. Instead, it uses wireless infrared communications to direct workers to select items found on storage shelves. Workers then deposit the items into totes arranged on mobile carts.

The system incorporates a small PDA device attached to the cart. The warehouse management system sends picking instructions via radio frequency to the PDA, which then uses voice commands to direct the worker to the pick location. When the worker arrives, the PDA tells the worker to stop for a pick. Using infrared, the PDA then sends wireless signals that illuminate lights and quantity indicators on the storage rack and the cart. The lights on the rack indicate locations of items to be picked, while lights on the

cart designate the tote (or totes) to receive the items. Instead of the usual button to confirm picks, FoxFetch uses a proximity switch that detects motion. The worker doesn't have to depress the switch to activate it; he or she simply waves a hand past it. Henderson says these switches last much longer than conventional switches, which are the leading failure point of pick-to-light modules.

FoxFetch also offers a lower-cost option that eliminates the lights on the storage racks and simply uses the PDA to provide verbal picking instructions to the worker. The worker then confirms the location by scanning a bar code either at the rack or on the product itself. "The idea is to only place lights in areas that justify the cost of the lights. Otherwise, use voice and scanning," says Henderson.

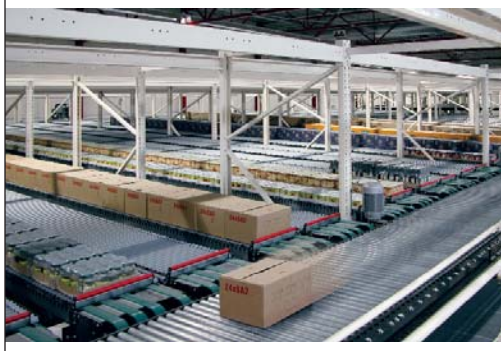
The mobile picking carts are designed to hold from six to 20 totes, which makes the FoxFetch a very flexible system for gathering orders, according to the manufacturer. The system can also be expanded as needed, with each section of racking and cart working independently within the larger system. (www.foxfiretechnologies.com/pdfs/FoxFetch.pdf)

7 A case to be made

Case picking can be a very labor-intensive activity for any distribution center. Cases, especially those containing bottles and cans, tend to be heavy and awkward to pick. It follows that automating case picking can save labor and reduce the risk of injury.

The Order Release Module from DLS is designed to do just that. Originally designed for large grocery operations in Europe, this system automates and sequences the picking of high-volume cases and is well suited for foods and beverages, consumer goods and other items regardless of packaging type.

The system is based on a flow rack design—albeit one with an unusually high number of horizontal lanes. For example, a grocer in the Netherlands that has installed the system has two modules, each with 500 stacked lanes. Each lane is 34 feet long and holds 20 to 30 cases. Stacked in levels with about 30 inches between them, the system provides very dense storage of thousands of cases. The grocery DC has seven levels in each module, but systems can be built to meet a facility's individual space and capacity needs.



Cases are first brought to the system from long-term storage and inserted into each lane, with one SKU per lane. The system uses a unique combination of gravity and drive motors to advance cases to the opposite end from where they entered the lane. When cases are required for an order, they are released from the lane one at a time, which permits cases to be gapped properly and in an ideal SKU sequence. Heavier items can be released first to assure they'll be positioned on the bottom of a pallet. Items can also be released in family groups, by route destination or in rainbow stacking order to optimize trailer space.

"You can fill a tremendous amount of volume from these lanes," says Bas Hollander, marketing manager for DLS. He adds that each level in the system can attain a throughput of about 900 cases per hour. This technology can retrieve items faster than other case-level systems, such as mini-loads, case carousels and extractors.

The lanes are also very flexible, as they can be re-slotted with SKUs as needed to reflect each day's order profiles. (www.nedcondls.com)

8 Make a run for it

The last picking technology we highlight takes us up to the pallet level. Though primarily a storage solution, Pacific Westeel's Pallet Runner system also provides fast access to pallets needed for full-pallet picks. It uses small battery-powered robotic shuttles, known as Pallet Runners, to move pallets in and out of storage and to keep them in a position where they can be easily retrieved for order filling.

Pallets can be stored 30 deep in the system's racks. "You can't get that kind of density with other storage systems," says Paul Haggett, sales manager for Pacific Westeel.

The typical Pallet Runner system will hold anywhere from 3,000 to 8,000 pallets at about half the cost of deep-lane pushback racking, according to the company. The system is designed for fast-moving pallet-sized SKUs and consists of stacked lanes within the racking that stretch from one end of the module to the other, with one SKU per lane. Think of narrow-aisle storage without the aisles and it becomes clear

how the system works. Products are normally deposited at one end of the lanes and retrieved from the other. This provides first-in/first-out processing, though it can just as easily operate with pallets pulled from the same end in which they enter for very deep lane storage and first-in/last-out handling.

To place a pallet into storage, a worker first inserts one of the small robotic Pallet Runners onto rails directly below a pallet lane. The pallet is then deposited into the lane directly above the Runner. Using a remote control, the operator then signals the lifters on the Runner to raise the pallet off the rack. With the pallet in tow, the wheeled Runner then rides the rails, carrying it to the most distant spot in the lane. It deposits the load, then returns to handle another pallet. A worker quickly removes it from its previous lane and places it into the lane where it's needed next. One Pallet Runner shuttle can typically service 800 to 1,500 pallets, depending on throughput.

Lift trucks then gather loads from the opposite end of the racks from where they entered. The advantage of this system for picking is that the lift truck doesn't have to enter the rack area to retrieve a pallet. The driver simply gathers the next load from the end of the rack. This saves time and reduces the risk of damage from trucks entering the racking areas.

When a Pallet Runner shuttle is not needed for insertion duties, the warehouse management system can instruct it to perform a "shuffle" in which it indexes all pallets forward to close any gaps and to make certain that a pallet is at the end of the lane ready for picking.

The Pallet Runner shuttles operate on four batteries, which usually last about 20 hours on a five-hour charge. An optional two-battery quick charge system is also available.

The system is designed to work with 40- by 48-inch pallets, but it can be customized for other load sizes. (www.pacificwesteel.com) □