Quiet Logistics’ next step into robotics

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EDITOR’S NOTE: This is the third in a series of three System Reports that look at the emergence of robotics in warehousing and distribution. In March, we featured a robotic layer picking solution used by L’Oreal to build mixed SKU pallets in Kentucky. In April, we looked at how VSP is using piece picking robots in conjunction with automated storage to handle eyewear lenses and frames in its California lab. We wrap up the series by going inside Quiet Logistics’ e-commerce distribution center in Devens, Mass., where mobile robotics is enabling zone picking. Together, they provide a glimpse at how robots might be used in the future.
NECESSITY IS THE MOTHER OF INVENTION AT QUIET LOGISTICS

Faced with the loss of a robotic pick solution, Quiet Logistics invented its own robots. Are they the next generation of robotic-enabled picking in the warehouse?

They say necessity is the mother of invention. Both necessity and invention are currently on display at Quiet Logistics, a third-party provider of e-fulfillment services for familiar names in the premium branded fashion and apparel industry like Bonobos, Zara and Mack Weldon.

Start with a walk through of a 300,000-square-foot distribution center near the Fort Devens Army Base in Devens, Mass. There, some 200 orange Kiva robots shuttle 5,000 shelving units from a storage area to picking stations where order selectors fill orders.

By Bob Trebilcock, Executive Editor
As one of the early adopters of mobile robotics for e-commerce fulfillment, Quiet has been using Kiva since 2009. And while the leading edge is called the bleeding edge for a reason, Bruce Welty, Quiet’s co-founder and CEO, says that getting out front with robots was a conscious decision he made with his partner Mike Johnson, Quiet’s president. “No one had really used mobile robotics like this before,” says Welty. “Mike and I felt that the distribution industry was mature and ready for disruption.” While Kiva was a giant step away from the status quo, especially for 3PLs that typically shy away from automation, “you don’t disrupt by taking incremental steps,” Welty adds.

Of course, the Kiva solution has now been around for nearly a decade. What’s more, it has been off the market since 2012, when Amazon acquired the company. Although Amazon is still supporting existing installations like the one at Quiet Logistics, that support will end at some point in the future.

For that reason, if you travel a mile down the road, you can see necessity—and invention—on display at a 200,000-square-foot facility operated by Quiet. There, in an area reserved for one customer, a handful of small, mobile robots carry totes representing one single- or multi-line order from a packing station to picking locations. Once there, lights on the base of the robots blink to alert the order selector in the zone that an order is ready to be picked. On the screen of an iPad, the order selector sees all the details of the task to be performed. After a hands-free scan of the item into the tote using a scanner underneath the iPad, the warehouse management system (WMS) directs the robot to its next task as if the robot was another associate on the floor. That could be another pick location or, when the order for that tote is complete, to a packing station. There, a packer unloads the tote, scans a new one onto the robot, and off it goes.

Clearly, this is a departure from Kiva. Instead of bringing goods to the order selector, associates still walk to a pick location; the robots eliminate non-value-added travel. At just 120 pounds fully loaded, the robots are a fraction of Kiva’s 1,300 pounds, allowing them to work side-by-side with people in an existing zone pick. No changes are required to the infrastructure. Given their relative light weight, the robots could work on a mezzanine.

The robots are guided by LocusPoints—the company’s term for a 2D bar code installed on the bottom of the storage units. And while Kiva managed the inventory inside the Kiva system, Quiet’s WMS is in charge of inventory management. When the building is fully operational, Welty anticipates that he will be able to run it with about 150 of the units.

“Kiva’s design concepts are 10 years old,” says Welty. “Given the technology limitations of the time, they did a brilliant job. But a lot has changed since then.” Today, sensors are a fraction of the cost and open source software is widely available, saving development time. “If we had to do today what Kiva did back then,” he adds, “our solution might look a lot like theirs.”

While Locus is admittedly selling a product, the real sale is a different approach to work in the warehouse and distribution center at a time when dependable manual labor is increasingly difficult to find. “We have signs up
like the Gilt Groupe, one of Quiet’s first customers. Their plan was to specialize in processes that allowed e-tailers to provide a unique customer experience.

The question was: Should they rely on conventional processes with lots of touches but also lots of flexibility, or should they invest in a highly automated facility with great throughput but less flexibility? “We looked at those two traditional approaches to third-party distribution and thought there had to be a better way,” says Welty.

Quiet’s concept was to create a shared asset/shared infrastructure fulfillment platform for piece picking. If the platform worked, it didn’t matter if one customer left the building and another took its place. Once the new customer’s inventory was in the system, piece picking was piece picking. What’s more, Quiet wanted a solution that allowed them to start small and scale as the business grew.

Enter Kiva Systems. The solution appeared ideal. Quiet in theory could begin with a few mobile robots and shelving units and simply plug in addi-

“We started out in e-comm fulfillment because that’s where the activity was,” Welty says, adding that the plan was to specialize in processes that allowed e-tailers to provide a unique customer experience.
A better way

This story could have ended there. Then came March 19, 2012, when Amazon announced that it was purchasing Kiva Systems for $775 million. The number alone was astounding for a materials handling company with annual sales of about $100 million, as reported in The Boston Globe. Welty had an entirely different reaction: “The first thing I said was: ‘My life just changed.’”

At some point in the ensuing years, Amazon announced that it was taking Kiva off of the market and would stop supporting installed systems in the future. Welty and Johnson began to ask: What if we developed our own robotic solution? At some point in 2013, Welty jumped on a plane and flew around the world to visit every robot company he could find that might build a robot for Quiet. “No one we talked to had experience in distribution,” he says. “We also realized that if someone came up with a great solution for us, Amazon may buy them, too, and we’d be right back where we started.” After his whirlwind tour, Welty proposed to his board that Quiet build its own robot.

Near the end of the year, the initiative got underway with the purchase of a $300 kit robot. They weren’t exactly starting from scratch. At that point, they were no longer early adopters: Quiet had almost five years of experience working with robots in a distribution setting and understood what worked well with Kiva as well as its short-comings. For one, the pods that carried inventory from a storage area to a picking station were heavy—people couldn’t work in the same zone as a Kiva robot—and expensive to build. Moreover, the weight meant it was impractical to go vertical on a mezzanine. Instead, they would build a smaller, lighter robot that could work side by side with people in an existing infrastructure and on a mezzanine.

Next, the Kiva bots were never plug and play as advertised. In reality, adding a robot to the fleet required someone...
from Kiva to come in and work on the proprietary software. What's more, Kiva managed the inventory in the storage pods. The system happened to do that very well, but still, the location of inventory was a black box to the WMS. If the Kiva system went down, there was no manual workaround. Meanwhile, Welty had extensive experience in the WMS industry, having spent a dozen years building a WMS company before selling it to EXE Technologies in 2001.

The goal then was to design a robot that furthered the platform Quiet already had in place—shared assets/shared infrastructure—while addressing some of the short-comings of Kiva. Given Welty's extensive background in warehouse management software, he says "we built up a library of software because, at heart, we really are a software company." In 2014, the team bought a bigger robot and developed it to the point that it could travel and navigate anywhere in the office. At the end of that year, they began to hire a team, including some former Kiva employees, and partnered with Olin College in Needham, Mass., and a design firm in California. Locus Robotics was underway.

Progress was relatively fast. By the spring of 2015, the robot was able to get an order from a WMS and travel to a pick location. That summer, the team did a series of test orders using real product stored in the warehouse but for dummy customers. By last November, they were ready to go live with the first Locus Robotics customer.

At present, there are about five robots working in that area. Welty describes the present robot as Locus 9.0—while it's the first commercial prototype, it's the ninth version since they started experimenting with a kit in early 2014. The plan is to approach Locus the same way they approached Kiva. Begin with five to 10 robots handling one customer. Once the processes are perfected, expand one zone at a time across the building. When, in the future, Amazon stops supporting Kiva, Quiet will expand the Locus solution into that building as well. Meanwhile, Welty is reaching out to potential customers to develop the commercial business.

"The robots are light and can work with people. Expensive pods are a thing of the past: Quiet stores its inventory on the floor in inexpensive, stackable, corrugated bins." —Bruce Welty, Quiet Logistics

He believes that Locus has effectively addressed the short-comings of Kiva. The robots are light and can work with people. Expensive pods are a thing of the past: Quiet stores its inventory on the floor in inexpensive, stackable, corrugated bins. The robots really are plug and play. Once the server and software for the robotic system are in place and integrated with the WMS, adding a new robot is similar to adding a new bar code scanner or voice headset to an automatic identification system. "All you have to do is turn on the new robot and it will add itself to the network," Welty says. What's more, the WMS manages the inventory and assigns tasks to the robot the way it would an associate; if the system goes down, you can still run the facility in conventional mode.

While he is now part of the new robotics company, Welty thinks it's still a mistake to think of this as a robotic solution. "I think of what we’re doing as a solution that happens to include a robot," he says. As he looks at how this space is emerging, he finds that too many companies are trying to create robots that do everything a human does, including smile or walk up and down stairs. "Our view is that we should let people do what they do well and let robots do what they do well. We’re not good at repetitive and boring tasks," he says.

And while Welty believes that in Locus they have come up with a better way, he understands that this is an evolving space. “Ten years ago, Kiva was a brilliant solution and now, we believe we’ve found a better way,” he says. “Ten years from now, there will be another better way.”

After all, there will always be the necessity that will drive the next round of innovation and invention.
Robotic-enabled picking comes to the fore
Mobile robotics reduce the travel time associated with order fulfillment.

I n one of its two distribution centers in Devens, Mass., Quiet Logistics is launching a mobile robotics solution to enable zone picking for e-fulfillment. At present, the solution is up and running for one zone but will soon be expanded across the 200,000-square-foot facility.

**Receiving:** Most items arrive at the facility on air shipment pallets or as parcel deliveries from FedEx or UPS. Deliveries are received by purchase order and reconciled for quantity and quality (not shown). Once a delivery has been inspected it is entered into the warehouse management system (WMS), and labeled with a license plate bar code label that represents the quantity and SKU. Product ready for storage is then put onto a rack and staged for putaway.

**Putaway:** Putaway is directed by the WMS. In the area enabled by mobile robotics (1), a tote with items ready for storage is scanned onto one of the robots at a packing location (2). The WMS then directs the robot to a spot next to the putaway location in the storage and picking zones (3). The robot confirms it is at the right location by scanning "LocusPoints," or 2D bar codes installed on the storage system that corresponds to that location. When the robot is at the right location, it stops and the lights turn green, to indicate that work is available. Putaway instructions are displayed on the screen of the iPad on the mobile robot. The associate can confirm the putaway by scanning the storage location.

**Replenishment:** The replenishment process is the same as the putaway process.

**Picking:** The picking process begins at the packing table (2). There, a packer inducts a new tote by placing it onto a holding tray on the mobile robot. When the bar code on the tote is scanned by a scanner located underneath the iPad touch, the WMS assigns the robot its next task. Guided by the LocusPoints, the robot travels to a picking location (3), then the lights turn green to alert the picker to go to that robot. The task details are displayed on the iPad. Based on those instructions, the associate scans an item or items into the tote. Once the items from that location have been picked, the robot goes to the next location for a multi-item order or returns to the packing station once all of the items have been picked.

**Packing and shipping:** The robot takes the full tote to the proper packing station (2) for that customer. The tote is unloaded onto the packing table and the next empty tote is scanned onto the robot. The packer then scans the full tote to initiate packing. The system confirms the order and packing instructions and prints out any labels, packing slips and bills of lading required to ship the order. The box is then closed, labeled and placed on a pallet or pushed onto accumulation conveyor and moved to a parcel delivery truck (not shown).

System suppliers
**MOBILE ROBOTICS:** Locus Robotics Corp., locusrobotics.com
**MOBILE RF COMPUTER:** Apple iPod Touch, apple.com/ipod-touch
**LIFT TRUCKS – STOCK PICKERS:** JLG, jlg.com
**WMS:** Locus Robotics Corp., locusrobotics.com

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