



PHOTOS COURTESY OF ZAPPOS

a DC gets its own fast fulfillment

With sales surging, online retailer Zappos.com needed an order picking technology that could be up and running quickly. The answer? A system that uses robots to bring goods to order pickers.

ASK ITS CUSTOMERS WHAT TYPE OF COMPANY ZAPPOS.COM IS, AND THEY'LL likely tell you it's an online retailer of shoes—and maybe accessories and apparel. But Zappos itself would tell you something different. As it explains on its Web site, Zappos considers itself to be “a service company that happens to sell shoes, handbags, and anything and everything.”

What Zappos means by “service” is what supply chain professionals would call order fulfillment. In its online profile, the retailer attributes its spectacular success over the past nine years to a commitment to speedy order delivery and a guarantee of product availability (the company says it will not offer a product for sale unless it's physically present in its warehouse). It's hard to argue with the results. Since its founding in 1999, Zappos.com has recorded double-digit—sometimes even triple-digit—sales increases every year, and it's looking forward to more of the same. The privately held company expects sales to surpass \$1 billion this year, which would mean growth of about 20 percent over 2007 figures.

As gratifying as that sales growth may be to, say, management and accounting, it presents enormous challenges for the distribution centers that must fill all those orders. The company stocks more than 3 million items across 1,400 brands, and runs what could only be described as a high-volume shipping operation. Craig Adkins, vice president of fulfillment operations for Zappos.com, says the retailer moves about 35,000 units daily through its two distribution centers in Shepherdsville, Ky., which include its original 280,000-square-foot building and a new 832,000-square-foot facility. Peak season volumes can hit 60,000 units daily, all shipped directly to consumers. Nearly all items require split-case picks.

In order to keep up with demand, Zappos continues to expand its fulfillment capabilities. But when it comes to installing new equipment, it has to proceed with caution—its very public commitment to prompt order turnaround means there's little margin for error. So it's no surprise that, when it went to choose a fulfillment technology earlier this year, Zappos was attracted to a system that promised rapid deployment.

The company found what it wanted in a technology developed by Woburn, Mass.-based Kiva Systems that relies on robots to move products stored on portable shelves to order pickers. Because there are no racks or conveyors to install (all of its hardware components are mobile), the Kiva system offered the prospect of a quick installation. “One of the challenges of growing fast is that we need a kind of just-in-time installation, which Kiva offers,” says Adkins.



In June, the company announced that it had completed installation of a Kiva Mobile Fulfillment System in one quadrant of its new 832,000-square-foot DC. True to its billing, the system proved simple to deploy. The complete installation took about four months from the time the two companies signed a contract until the system was up and running.

A good fit

When it came to purchasing the new technology, Zappos.com started small: Its initial order with Kiva was for 70 robots. Zappos could have used more, says Adkins, but the company wanted to test the system first to validate its assumptions about how it would perform and ensure that its economic analysis was correct.

The actual installation began shortly after the contract was signed—something Kiva was able to accomplish because it already had the groundwork in place. Early in the negotiation process, Kiva asks potential customers for detailed shipping information. “We create an exact simulation of the warehouse environment, including orders and volume,” says J.D. Harris, vice president of professional services for Kiva and the on-site manager for Zappos.com’s installation.

While Kiva assembled the robots at its Woburn plant, the company sent a team to the Zappos.com site to prepare the floor, installing two-dimensional bar-code stickers that the robots use for navigation. Once the configuration work was completed, Kiva delivered the robots, which it terms the “drive units,” and the shelving units, or “pods,” and the software was configured and tested.

Adkins reports the installation progressed rapidly once the robots, which can handle loads of up to 3,000 pounds, were delivered. “When you take them off the truck and turn them on, they start to communicate,” he says. “You can tell them to go out in the grid and start driving around.

“Soon after the bots arrived, we started testing those and bringing in the shelving and deploying that,” he continues.

“Then the stations were built and assembled; then we tested communications between the software [applications].”

The Kiva system currently handles about 15 percent of the overall volume shipped from the DC, and Adkins expects to buy additional units. “In subsequent years, as we grow,” he says, “we will order more.” Adding on will be easy, he says, because the Kiva system is highly scaleable. “You don’t have to buy entire systems,” he explains.

“You can buy one robot and one shelf. Then it scales with the business. That’s a lot of capital cost avoidance.”

Fast and flexible

Speedy installation and scaleability are just two of the Kiva system’s advantages, says Adkins. Zappos has also found it to be extremely energy efficient. Because the system uses robots, not humans, to retrieve inventory and bring it to the picking stations, there’s no need to keep the lights on in the areas where goods are stored. And unlike powered conveyors, it does not use motors that must operate constantly. “The energy savings are pretty huge,” he says.

Adkins expects to see other savings opportunities as well. He reports that Zappos’ analysis indicates that using the Kiva system should result in about a 40-percent reduction in labor costs. He explains that the savings will come from the system’s ability to receive and put away simultaneously on the inbound side and to handle picking, sorting, and packing simultaneously on the outbound side. Another labor benefit, according to Adkins: Training is simple. “The learning curve to use the picking stations is very short,” he reports. “We can take anybody and train them in 15 to 30 minutes.”

Adkins adds that another key advantage of the Kiva system is its ease of reconfiguration. Changing the robots’ paths—and thus, the product flow—requires little more than moving the bar-code stickers on the DC floor that the robots use for navigation.

Similarly, it will be a simple matter for Zappos to adjust its operation as its product mix changes. Right now, 90 percent of Zappos’ business is shoes, Adkins says, but the company expects the balance to shift more to apparel in the coming years. As that happens, it can simply change the items stored on the shelving pods without affecting the way the system works.

And finally, there’s the portability advantage. In Adkins’ eyes, one of the biggest benefits of all is the ability to move the entire system if need be. “If we have to move,” he says, “it is easy to pick up and go.” □

