Computer software agents process incoming orders and forward data to suppliers and robot "workers." Warehouse operations in 2015 are highly automated, with robots removing merchandise from towering storage bays, packaging orders and even taking over final assembly of some items. Transponder tags attached to goods ensure that orders can be tracked all the way to the customer.
Goods on the Go

In 2015, a highly optimized logistics chain will incorporate a comprehensive electronic network including automated warehouses that reliably track goods from an order’s receipt to its delivery.

It’s late afternoon, October 15, 2015: Susan, managing director of a mail-order company, leaves her office and heads for the warehouse. She knows that keeping up with operations is the best way of improving operational efficiency. Today she’ll be chatting with employees, taking a look at the warehouse setup and checking the quality of the company’s logistics. Fortunately, the days of back-breaking warehouse work are now a thing of the past. Only a few years ago, work-
Like termites (left), companies, and in particular their warehouse and distribution centers, need tightly linked logistics chains.

ers still had to stack tons of heavy boxes every day. Today, this part of the operation is fully automated. Moreover, the robots that put the boxes on the pallets can work continuously and achieve even greater packing densities than a human worker.

The storage shelving system is fully automatic. At each level, robots whizz along rails from one bay to the next, placing the goods onto a conveyor belt, which then takes them either to the assembly area or straight to the packaging machine. Customers demand more customized products than ever before — and that means everything from personalized cell phones to tailor-made clothing. Delivery times, too, are very fast, with customers expecting orders to arrive within three days at the latest.

On the logistics side, Susan’s company can now even hold its own with the automobile industry, once the great role model in this field. In fact, her operation achieves near-perfect delivery reliability rates. Susan studies the large, newly purchased OLED flatscreen displays, which show the entire process, from the receipt of customer orders to the delivery of goods. “That’s great. We’ve achieved 99.5 percent reliability today,” she says, praising the workforce. “But I’m sure we can do even better than that,” she adds with a smile. “Let’s choose a delivery that we can analyze in detail.”

A click of a mouse is all it takes to call up an order received at 6:45 p.m. on October 12. “One toy robotic dog, one dark-blue designer dress and one household robot,” it says. A second later, the computer displays the availability of the goods. The dog is in stock, but the dress had to be made to order by a supplier and didn’t arrive until two days later. In 2015, customers still like to go shopping in fashion boutiques. What’s changed, though, is that shops now keep only one example of a particular item in each size. If a customer likes a garment, he or she is measured optically and the article is made to order. Again, the aim is to limit delivery time to less than three days.

Mail-order companies in 2015 not only maintain gigantic warehouses, but often also assemble items, such as household robots, themselves. The October 12 order specified a robot with a navigation system and vacuuming and window-cleaning functions. The computer automatically asked suppliers when the robot’s components would arrive and then calculated the completion time for assembly: “October 15, 10:13 a.m.”

“Why did we need 20 minutes to package the goods and another 20 to reach the loading bay?” Susan asks the Station 4 supervisor as she examines output figures. “Why did it take so long?” The supervisor explains that he decided to load the truck right to the roof, once the software agents had calculated that it would be cheaper to deliver to a number of destinations on one run. And the route planner had worked out an optimal itinerary. “So, more pallets had to be loaded, and everything took just that much longer.”

Susan nods, aware that sensors record the times that items enter and leave the warehouse. Thanks to small radio-operated transponder tags fixed to the goods, inventory can be checked at any time.

More than 10 years ago, Susan was one of the first in the business to replace bar codes with intelligent transponder tags. Since then, the volume of missing merchandise at the company has dwindled to practically zero. Similarly, satellite technology is used to determine a truck’s precise position and track the exact progress of the goods. Seven years ago, she changed from GPS to the GALILEO European satellite system, which had started to offer the same services at lower cost. A quick glance at Station 7 — Deliveries — tells Susan that no one was at home when the order arrived. So the mailman left the package in the home delivery box, a large mailbox built into the wall of the house. “Good work. It took barely 66 hours from receipt of the order to delivery of the goods at the customer’s house,” says Susan, who already knew this information. That’s because in this particular case, Susan is the customer, and at 12:35 p.m. her home delivery box sent a message to her cell phone confirming that three packages had arrived. Just in time, thinks Susan, who is planning on wearing the new blue dress to the theater this evening.

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