



UNIVERSAL ROBOTS



COBOTS

Collaborative Robots Are Opening the Doors to Automating the Supply Chain

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Cover. Silicon Valley based logistics company DCL Logistics deployed a modular, scalable collaborative robot piece picking solution powered by the UR5e into their warehouse. The robot is mounted between two pick walls and above a conveyor to place orders from the shelf into boxes – scanning, picking, and placing one piece every six seconds.

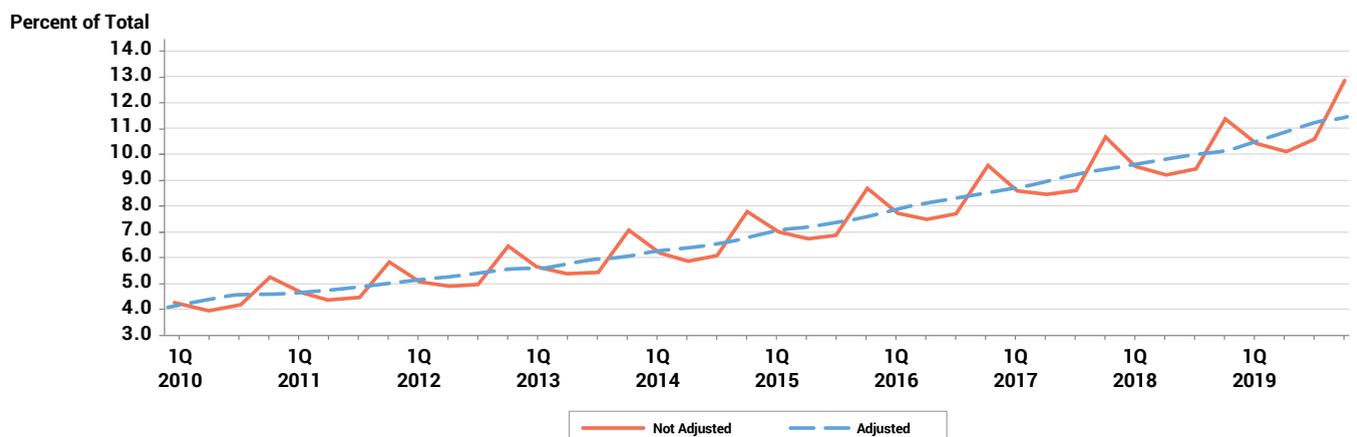
New Status Quo: Growth

E-commerce has become the fastest growing global retail sector, thanks to several trends like online retailers that offer fast shipping options, and social media platforms that host complete purchase transactions in their ads. According to the US Census Bureau, in 2019 nonstore retail (predominantly e-commerce) generated the greatest year-over-year sales growth over all other categories. Mega retailers that offer same-day shipping and one-click shopping experiences are ensuring that consumer demand for fast shipping will preserve double-digit growth in the e-commerce sector.

Distribution centers (DCs), fulfillment centers (FCs), and other warehousing facilities bear the responsibility for adapting to these new trends. Handling increased speed and complexity has always yielded competitive advantages to logistics operations, and as e-commerce opens the doors to global consumers shopping for more and more products, DCs and FCs across the country are tapping into a new global pace of order fulfillment.

Despite the many technologies embraced in DCs and FCs over the years, traditional robots have been unsuited to the warehouse environment. Factors like disruptive safety fencing, slow

**Estimated Quarterly U.S. Retail E-commerce Sales as a Percent of Total Quarterly Retail Sales: U.S. Census Bureau
1st Quarter 2010 – 4th Quarter 2019**



E-commerce is projected to grow as a % of total retail sales. Considering that goods like gas, homes, cars and auto parts count towards total retail, the share of goods purchased online is even larger than it appears.

deployments, high cost, and impractical ability to automate more than one task without costly programming, kept automation benefits away from any industries that weren't rapidly reproducing identical parts.

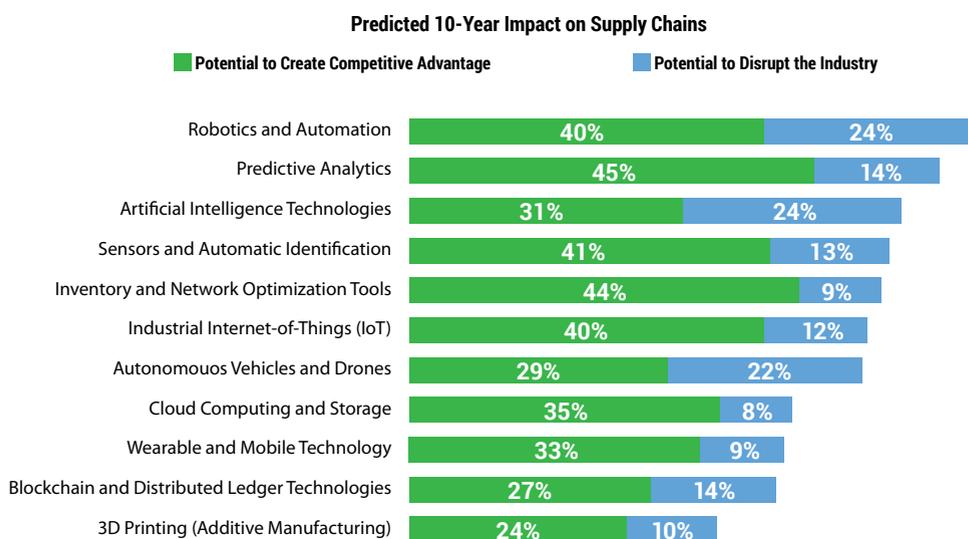
Collaborative automation arose in the 21st century from the need to overcome these shortcomings of traditional industrial robots. Since developing the first commercially viable collaborative robot (cobot) in 2008, Universal Robots (UR) has led the market in providing affordable automation that unites emerging technologies like artificial intelligence and machine learning to solve emerging challenges in many industries that had not historically used automation.

Resistance to Automation

Automation is critical for the supply chain industry to maintain growth through labor shortages. The Materials Handling Institute (MHI), a trade association whose members represent leading supply chain companies, asked thousands of supply chain professionals in their 2019 annual industry report which digital technologies would yield the greatest boost to productivity – they answered robotic

automation. Every manual touch a product makes on its way through a distribution or fulfillment center is a process that can be streamlined, and tasks such as picking, sorting, and packaging have been successfully automated for decades in manufacturing and automotive sectors.

However, bin picking and conveyor sorting require the ability to recognize and pick a wide range of items with different form factors, which are often mixed together in different orientations. Previous generations of industrial robots required 3D software models of the items they needed to handle. Competitive supply chain facilities, though, process hundreds of thousands of unique SKUs daily. Though not all SKUs need entirely distinct modeling – most brands of toothpaste, for example, produce the same range of sizes, weights, and packaging materials – logistics operations couldn't benefit



MHI along with Deloitte surveyed over 1000 supply chain professionals in their annual 2019 supply chain report, and concluded that robotic automation offers the greatest productivity increases among all emerging digital technologies.

from traditional automation without sinking costs into updating and maintaining massive data sets of their product models.

Key Benefits of Collaborative Robots in the Supply Chain: Flexible Deployment

One way automation delivers value is by meeting or exceeding human throughput in whatever cell it operates. Traditional robots meet this need by using complex end-effectors to automate only one task, and they rely on a high volume and low mix of parts to speed up production. Cobots offer the balance of high-volume automation with the flexibility of deploying one robot to multiple applications in a single day.

Universal Robots supports an entire suite of plug-and-play tooling in its certified UR+ partner showroom, allowing one cobot to quickly utilize different scanners, grippers, range extenders, and autonomous moving vehicles, as a warehouse's needs change. This streamlined procurement of components speeds up proof of concept time as companies begin to automate, and helps to reduce recurring engineering once cobots are running programs.

Part of the shift from brick and mortar store deliveries to home deliveries of e-commerce is the shrinking size of the average unit processed in a warehouse. Any impactful robotic automation in a DC and FC needs to be flexible not just among several applications, but flexible

in picking deployments specifically. Online customers buy individual products rather than cases and pallets which have historically been the smallest size unit delivered to retail stores.

Additionally, a home delivery contains significantly fewer products than a full store's inventory shipment. Fulfillment therefore centers have a growing need for high-mix, non-repetitive robotic piece picking processes that support a wide range of products and high throughput for the growing number of small-sized orders.

Key Benefits: Easy to Program

Collaborative robots can teach themselves to pick things they've never handled before in unstructured environments like a bin or tote. Instead of storing massive data sets of 3D models for scanners and grippers to recognize, cobots use flexible grippers that combine suction,



RightHand Robotics has united model-free vision, machine learning, and flexible, compliant grippers with integrated sensors to maximize throughput like in this bin-to-bin picking program.

force sensors, and compliant fingers to pick every new object it encounters, without failing just because a product has shifted in its bin.

Several innovative cobot-powered systems are now on the market that combine an easy-to-program collaborative robot arm, computer-vision and machine-learning systems, and a gripper with sensor feedback. These systems can be programmed by warehouse floor workers thanks to UR's award-winning free online academy and intuitive teach pendant interface.

“Any impactful automation in a DC or FC needs to be flexible not just among several applications, but flexible in gripping deployments specifically.”

Labor Challenges

The US unemployment rate is creeping down past 50-year lows, with the national unemployment rate at 3.6% and 13 states below 3% unemployment at the start of 2020. While

low unemployment is likely driving retail sales growth, the growing number of available jobs tells another story. Since

December 2018, the Bureau of Labor Statistics has reported more job openings than people available to fill them – a first in US history.



DCL's application includes a conveyor that accumulates boxes, aligns them and moves them into loading position. The robot picks up a product every six seconds and brings it to a scanner, then puts the product into the box. If the item is incorrect, the robot places the item in a reject bin and continues picking the next item without pausing production.

The supply chain is feeling this shortage. In 2018 and 2019, there was more warehousing space built than projected warehousing jobs to fill that space, according to the report from real-estate brokerage firm CBRE, *The US Supply Chain Quandary: Finding Enough Workers for an Expanding I&L Sector*.

One quickly growing company who solved their labor shortage with cobots is DCL Logistics. As a full-service fulfillment and logistics company, DCL provides everything from direct-to-consumer fulfillment, business-to-retail fulfillment, and other value-added services. Their business has grown dramatically alongside the recent e-commerce surge, and they needed

technology solutions to maximize their worker productivity in a traditionally manual-labor-intensive sector.

The right mix of technical competencies and professional skills like critical thinking and innovation is hard to attract and retain in the supply chain. DHL Supply Chain reports in its 2019 survey of supply chain professionals that the factor with the greatest impact on the supply chain's talent shortage is changing job requirements: according to the report "Eighty-six percent of respondents ranked this factor at either a four or five – high or very high – in terms of its effect on companies' ability to find the right talent."

Key Benefits: Safe and Collaborative

"Universal Robots provided a solution that fit our needs," says Brian Tu. "It's modular, so we could scale slowly and understand what we need. Number two, it was flexible in the way it was programmed so we can build and integrate into our systems very easily. And number three, it could work alongside our current workforce, and that was really important to us: making sure that the robots would augment what we're currently doing."

Cobots are designed to work with people, not replace them. Skilled workers build skilled cobot applications for the equipment and facilities they know, and cobots drive up DCL Logistics workers' value. Once a cobot had automated their most repetitive, low-skill, or unsafe tasks,



The Quick Deployment Kit from MDCI Automation identifies the pick points for items in a pick zone and sends the points to the UR cobot that picks and places each item onto a place zone/conveyor. The QDK can keep up with fast-moving conveyor speed and can learn to pick targets via human assistance through a remote alerting technology.

workers were freed up to pursue their most value-added jobs around the warehouse. In the case of their first application, DCL's cobot generated efficiency savings of 500%: "The robotic system can do within two hours what a team of five people would do in an entire day," states Brian Tu. "The robotic systems actually save us greater than 50 percent in labor costs."

After an initial risk assessment, most collaborative robots do not require disruptive safety fencing or cumbersome safety protocols for employees. They can also work alongside people, allowing for tasks such as moving goods to a picker, scanning, labeling, palletizing, or packaging to be done collaboratively. Whether alleviating a worker from their most repetitive tasks or collaborating with someone in a workcell, cobots optimize productivity through human-machine pairing.

Key Benefits: Fast Set-up

Cobots from Universal Robots have their own robust off-the-shelf shipping. On average, UR cobots arrive at facilities within seven days of a purchase order, and typically start running a first program from unboxing within one day. Compared to the slow installation period of traditional industrial robots, competitive shipping facilities that cannot stop operating for complicated robot set-ups turn to cobots.

Universal Robots' fast set-up allow users to boost productivity quickly. Thanks to UR's easy

programming advantage and online Academy, DCL met their out-of-box application goals without prior robot programming experience from team engineer Isaac Toscano. "With Universal Robots," Toscano reflected, "you can actually program it coming out of the box with just some basic tutorial that you can take, and with the teach pendant, easily make simple commands and from there, build onto your projects."

Key Benefits: Quick payback

Fast deployments lead to fast payback. For DCL Logistics, their cobot reached payback in as little as three months, prompting them to envision even more collaborative robots in their facility. Dave Tu says, "We imagine over the next five to ten years that robotics as part of the DCL operation is going to be even more important. As we integrate more systems, we're going to go from one robot system to multiple robot systems, and the vision right now is to have as many as 10 to 20 robots."

Collaborative automation needs to fit into a business plan like any other capital equipment investment. UR cobots routinely pay back within a year, and the online library of case studies features dozens of cobot installation examples meeting this timeline.

Universal Robots has also teamed up with financial solutions partner DLL to offer cobot lease and rental options, along with other financial services designed to make automation

even more affordable. For busy production seasons or for quickly scaling up automated warehouse processes, this robots-as-a-service model allows more companies to realize their automation solutions quickly.

Conclusion

Consumer demands are setting a new precedent in retail. Competitive fulfillment centers need to scale up the complexity of their processes, the speed of their order fulfillment, and the development and retention of their talent pool. Robotic piece picking adds value to workers, and leading supply chain professionals are rapidly scaling up collaborative automation to drive value from their workers and facilities. Assess your fulfillment and distribution centers for tasks that can be automated with cobots.



Ask UR experts how cobots can put automation within reach.

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