



Robots a Key Contributor to U.S. Manufacturing Growth

An Excerpt from "U.S. Manufacturing Is Building a Head of Steam" Article (D2P Magazine)

One of the keys to making American manufacturing more competitive is robotics, which have been used in industry for decades, but are now being deployed to do more than increase speed and precision. In factories throughout America, robotics and automation are helping U.S. manufacturing companies not only reduce labor costs and quicken time to market, but become more flexible and adaptive while maintaining high quality. A prime example is Rethink Robotics' Baxter, a mobile, 165-lb American-made robot that can be trained to perform new tasks—machine tending, part packaging, and kitting, for example—as they arise, freeing skilled personnel to perform higher-level responsibilities.

Baxter's Intera™ software platform, named to emphasize the interactive production capabilities of the robot, is the key to its flexibility. The software integrates smart software, multiple sensors, and embedded vision, and is upgraded periodically to enhance Baxter's performance. In a recent upgrade, Rethink introduced its Robot Positioning System to help users more quickly and easily re-deploy the robot after common plant-floor variations—like the repositioning of tables and fixtures—occur. Previous upgrades have expanded Baxter's skill set to enable the robot to tend machines, such as CNC lathes, ultrasonic welders, and press brakes; pack and unpack parts and components; load and unload lines; and perform kitting.

According to Rethink, the Robot Positioning System enables Baxter to adjust more readily to changing work environments by using environmental markers, called Landmarks™, in conjunction with its existing, embedded vision system. The robot recognizes the original locations of the markers, and, when those locations change slightly, can mark the new locations and adjust its movements accordingly. This ability to adapt to common variability on the plant floor allows manufacturers to deploy Baxter across multiple applications.

"Manufacturing robots have always been caged, not only to protect the workers around them from harm, but also to protect their precisely configured environments from being disrupted by those same workers," said Scott Eckert, CEO at Rethink Robotics, in a release announcing the Robot Positioning System. "With Baxter, we brought the manufacturing robot out of its cage by making it safe enough to work next to people; and now, we've made it safe for the robot to work effectively in real-world conditions as well, by allowing it to adapt to everyday variations that people naturally produce."

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Rethink Robotics' Baxter robot is deployed at GE's new Advanced Technology Lab in Plainville, Connecticut. Photo courtesy of GE.

Praxis Packaging Solutions, a Grand Rapids, Michigan contract packaging company that specializes in secondary finished goods packaging for the pharmaceutical, food, and consumer industries, was among the first to deploy the new technology. The company, no stranger to rapid reconfiguration of its production lines, benefits from the flexible automated labor that Baxter provides to meet those demands.

"We need our people and our automation to effectively work in a semi-structured, and sometimes variable, manufacturing environment," said Chris Hager, information technology manager at Praxis Packaging Solutions, in the release. "Rethink's Baxter robot, particularly with the new Robot Positioning System, provides a solution that can finally adjust to the changing conditions of our work cells."

Baxter's capabilities will continue to expand – even as the physical robot remains unchanged – as the software is upgraded. Enhancements to the software have already enabled Baxter to work twice as fast as it had earlier, with twice the precision previously possible, according to Rethink Robotics.

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“As a custom shop, every day presents a new challenge on the plant floor,” said Josh Rupp, process engineer at Du-Co Ceramics, in a release. “Most automation solutions don’t have the flexibility needed to respond quickly enough to these changes in demand—but Baxter does. Baxter picks up and moves parts four at a time, allowing us to respond in record time.”

Du-Co Ceramics, a ceramic parts manufacturer headquartered in Saxonburg, Pa., and a champion of the Made in America movement, was seeking flexible and affordable automation when it added Baxter to its ceramic parts production line. The robot, which sells for under \$30,000, works safely alongside the Du-Co team to place ceramic parts into a sagger, readying the parts for firing in the kiln. By rapidly adapting to changes in process and parts, Baxter allows Du-Co to improve operational efficiency while maintaining precision and quality in its complex ceramics parts. After smoothly integrating Baxter into a pick-and-place task, Du-Co foresees Baxter performing machine tending and bulk handling tasks in the future.

“Du-Co Ceramics is an excellent example of a manufacturer looking to balance flexibility with efficiency, precision and cost,” said Jim Lawton, CMO of Rethink Robotics, in the release. “Like many of the manufacturers we work with, Du-Co is maintaining a competitive edge by building the factory of the future, leveraging smart, adaptive automation solutions that can quickly adjust to dynamic environments.”

Baxter is in use today at numerous companies across the United States and Canada, from GE’s Advanced Technology Lab in Plainville, Conn., to injection molder Koller-Craft Plastic Products in Fenton, Missouri, and aerospace hydroformer Cutting Dynamics, in Avon, Ohio. Other manufacturers deploying the robot include the injection molding firms The Rodon Group, of Hatfield, Pa., and Vanguard Plastics, in Southington, Conn., the stonecutting tools manufacturer Trow & Holden, of Barre, Vt., and the sheet metal manufacturer Tradesman Manufacturing, of Lethbridge, Alberta.

Single-Arm Robots

Many manufacturers were just beginning to become familiar with Baxter when Rethink Robotics added another smart, collaborative robot, Sawyer™, to its family of robots in March. Smaller and lighter than Baxter at 42 lbs, Sawyer is a single-arm, high-performance robot designed to work in tight spaces while performing precise tasks that have, historically, been difficult to automate with traditional industrial robots. These tasks include smaller-footprint machine tending, circuit board testing, and other jobs that require high precision and significant agility and flexibility.

According to Rethink, Sawyer offers a 4kg (8.8 lb) payload, with 7



Rethink Robotics’ Sawyer Sawyer™, a smart, collaborative robot scheduled for limited release this summer, is designed to execute precise tasks—such as machine tending and circuit board testing—that have, historically, been impractical to automate with traditional industrial robots. (PRNewsFoto/Rethink Robotics)

degrees of freedom and a 1-meter reach that can maneuver into the tight spaces and varied alignments of work cells designed for humans. High-resolution force sensors are embedded at each joint, enabling compliant motion control that allows the robot to “feel” its way into fixtures or machines, even when parts or positions vary. This is said to enable an adaptive precision that is unique within the robotics industry, and allows Sawyer to work effectively in semi-structured environments.

“With Baxter, we introduced the concept of robots and people working together on the plant floor,” said Rethink Robotics President and CEO Scott Eckert in a March 19 release. “With Sawyer, we have taken that relationship to the next level, with a high performance robot that opens the door for many new applications that have never been good candidates for automation. As we continue to redefine this industry, we also continue to give manufacturers new ways of adding efficiency and flexibility into their operations.”

Sawyer, with a base price of \$29,000, is currently being field tested by several large manufacturing companies and is scheduled for release, with limited availability, in the summer of 2015. One of the companies field testing it is Jabil Circuit, Inc., the global electronic product company headquartered in St. Petersburg, Florida.

Chicago White Metal produces 12 die cast parts that go into the Baxter, playing a vital role in the robot’s construction.

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