



Robotics

Want the Best Robot for the Job? You'll Need a Job Description First

Kip Hanson | Dec 02, 2024

When the world's first industrial robot—the Unimate #001—joined an assembly line at a General Motors diecasting plant in 1959, American cars weren't even required to have seat belts and an onboard computer was the stuff of science fiction.

The Unimate worked quickly, proving its worth and transforming the manufacturing of automobiles long before the Digital Age reshaped cars themselves.

Within 10 years, GM's Lordstown facility was building 110 vehicles per hour, "more than double the rate of any automotive plant in existence at the time," according to a post on the website for the ***Association for Advancing Automation (A3)***.

In the decades since, these increasingly capable electromechanical helpers have become ubiquitous in U.S. industry, employed to do everything from CNC machine-tending and automated part inspection to flipping hamburgers and sanding drywall.

That growth has accelerated even further over the past few years as manufacturers struggle to find skilled workers while simultaneously competing with overseas suppliers whose labor costs are lower. Producers that turn to robots as the solution not only find themselves more efficient but, ironically, more likely to attract the workers they so desperately need.

The result? Robots are here to stay.

Picking Your Robot: They're Not Created Equal

If your shop is ready to hop aboard the ***automation express***, you should first get familiar with the different types of industrial robots and understand what kind of job each one is best at performing:

- **SCARA** is an acronym for Selective Compliance Assembly Robot Arm. These fast, compact and highly precise robots are typically used in the electronics and food industries for pick-and-place operations, packaging and assembly work. A SCARA robot probably assembled your smartphone

along with many of the parts in your laptop computer.

- **Delta** robots perform many of the same tasks just described. They're generally a bit more expensive, slightly less accurate, and limited to lighter payloads than a SCARA robot. Still, they're much faster and are, therefore, a favorite of manufacturers performing high-volume pick-and-place operations.
- **Mobile** robots, as their name indicates, are able to move around the warehouse or factory floor and carry goods from one location to another. Two types exist: Automatic guided vehicles (AGVs) require a magnetic track or painted line to find their way around, while smarter automated mobile robots (AMRs) rely on cameras and sensors to avoid getting lost.
- **Cobots (*collaborative robots*)** and their faster, somewhat more accurate cousins, articulated robots (robotic arms), are the workhorses of machine shops and sheet metal fabricators. Both can be used to load and unload CNC machine tools, weld components together, assemble products, and present parts to a gaging fixture or coordinate measuring machine (CMM) for inspection. Where robots require guarding of some kind to protect their human co-workers, however, cobots are force- and speed-limited so that they can often be deployed alongside people.

Of course, those represent just a sampling of the various types of robots available on the market today.

Other examples include gantry loaders—cartesian robots that load and unload parts from the top of a CNC lathe or grinder—and service robots, such as the Roombas that vacuum our floors, underwater robots to inspect our oil rigs and bridge foundations, and agricultural robots to pick the fruits and vegetables we eat. Fortunately, we also have robotic monster wolves to keep the crows away (yes, they're a thing.)

Letting Robots Handle Repetitive Tasks

Metrology provider L.S. Starrett Co. has added nearly a dozen robots to its production operation over the past four years, says Project Manager Carlos Estrada. Among them are SCARA robots as well as 6-axis articulated arm robots and cobots, most of which are used for machine tending, assembly and secondary operations.

"The main driver for our automation initiative has been the same problem everyone in manufacturing faces—it's very difficult to find workers, especially since COVID, and management decided early on to set up an automation team to start addressing these labor shortages," he says. "Contrary to what many thought at the outset, however, this was not done to replace anyone, but rather to give our people more time to work on value-added processes while the robots tackle the repetitive and mundane tasks.

"The robot's performance can be tracked and trends identified over time, allowing manufacturers to catch potential problems before there's a fatal failure."

Blake Kendrick
Renishaw Group

The choice between robots and cobots is not so much a matter of preference but rather determining what each application needs for success, Estrada says. That typically begins with a risk assessment to study the process, find potential safety concerns and decide if an "industrial robot" surrounded by a cage or other form of guarding or a slower but more easily deployed cobot is preferable.

Starrett is a leading provider of metrology equipment, so one might assume the company is a high-volume manufacturer, and that automation is a no-brainer. Not so, says Engineering Manager Cory Goodnow.

"Actually, we're the opposite," he explains. "Of course, we try to automate the long-running parts, but

most of our work is low-volume, high-mix, with many variants of parts that look similar but are, in fact, quite different. As such, we've had to spend a lot of time figuring out the best way to produce a wide range of parts that vary in size and shape. While it has presented some challenges, enhancing our automation has been a good experience and is the right decision."

Unleashing Robots' Full Potential

Many challenges can be made more manageable with a properly calibrated and maintained robot, notes Blake Kendrick, global sales and marketing manager for Industrial Automation at Renishaw Group. He points to a relatively recent offering from the U.K.-based manufacturer and metrology provider—the RCS product suite, designed to make robot setup, health checks, calibration and recovery of robotic applications easier.

"In a nutshell, we're taking Renishaw's tried and tested probing and machine tool calibration technology and applying it to the neighboring sector of industrial automation," Kendrick says. "We're especially well positioned to do so now that we ourselves have begun automating our processes and have developed solutions to alleviate some of the associated pain points."

Kendrick paints the picture of a maintenance supervisor who's just been given the green light to automate a production line. She'll quickly find that the integrators called in to do the work rely on their eyeballs to line up and calibrate the robot, leaving the customer with nothing in the way of calibration traceability. Worse, they'll then leave, assuming that the robot will continue to perform as it did on day one.

"Surprisingly, we've found that robot setup and maintenance practices are fairly archaic," he says. "Quite often, troubleshooting comes down to the service technician's sense of touch, smell and sight rather than the types of tools available for CNC machine tool calibration. It's all very subjective."

The Renishaw RCS product family makes those 20th-century practices obsolete, Kendrick says. Users have access to a suite of ballbars, touch probes and software tools that turn what was once guesswork and tribal knowledge into a scientific process.

"We are putting an independent and trusted device into the equation so that it can be achieved in a more streamlined, systematic way," he explains. "Everything is now traceable, you are provided with reports and can also pull out additional metrics and diagnostics so the robot's performance can be tracked and trends identified over time, allowing manufacturers to catch potential problems before there's a fatal failure."

How have industrial robots simplified your operations? Tell us in the comments below.

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