PROFILE

NAME: PAR Systems

LOCATION: Shoreview, Minn.

FOUNDED: 1961

WEBSITE: https://www.par.com/

CHALLENGE

Pick and place 1,800 plastic vials per hour into a thermal barcode printing system for a life sciences client with a very tight budget.

SOLUTION

A custom work cell using four Epson T3 SCARA robots interfaced to an Allen-Bradley PLC with a FactoryTalk® View Site Edition HMI to control all machine operations.

Schedule, Quality, and Budget

PAR Systems uses Epson T3 SCARA robots in a life sciences labeling application

"This was the only robot that could do what we needed to do and stay within our customer's budget," says Sam Johnson, engineering manager for PAR Systems of Shoreview, Minnesota. "It's very cost effective."

Johnson is talking about the Epson T3 All-in-One SCARA Robot, which his team notably used in a high-speed robotic labeling operation for a client in the life sciences industry.

PAR Systems, a large automation integrator, often uses Epson robots for their smaller-payload projects. Not only are Epson robots fast, precise and reliable, but the Epson RC+® development software is easy to learn.

The T3 has been running flawlessly for this client. The price to performance ratio was an ideal fit.

"It's been really nice," adds Chris Farber, Advanced Controls Engineer. "The customer is happy, and after two years, we haven't had any service calls."

Mission-Critical Industries

PAR Systems designs and integrates engineered systems in mission-critical industries, including life science, aerospace and nuclear. The company has about 450 employees, with 75% of their staff in engineering or technical roles. More than 40 of their engineers primarily serve customers with life science applications involving automated assembly of implantables, disposables, wearables, and diagnostics applications.

Two years ago, the PAR Automated Assembly team designed and built a high-speed work cell that prints labels on very large numbers of clear plastic vials.

"The product was comprised of three different sized vials, ¾ of a milliliter, 1 milliliter, and a 1.25 milliliter vial," Farber says. "We don't know what goes in the vials, but that's not uncommon. In the life science industry, there's a huge first-to-market advantage, and the tighter a company can hold its information the better."

The client was purchasing vials with a small barcode printed on a sticker on the bottom, but they needed a label with a larger, more readable, permanent barcode plus a human-readable number on the side of the vial. They asked the PAR Automated Assembly team to incorporate thermal printers that could print a white bar directly onto the side of each plastic vial, and then print the barcode and number in black over the white bar. Their goal was to imprint about 1,800 vials per hour, or one vial every two seconds.

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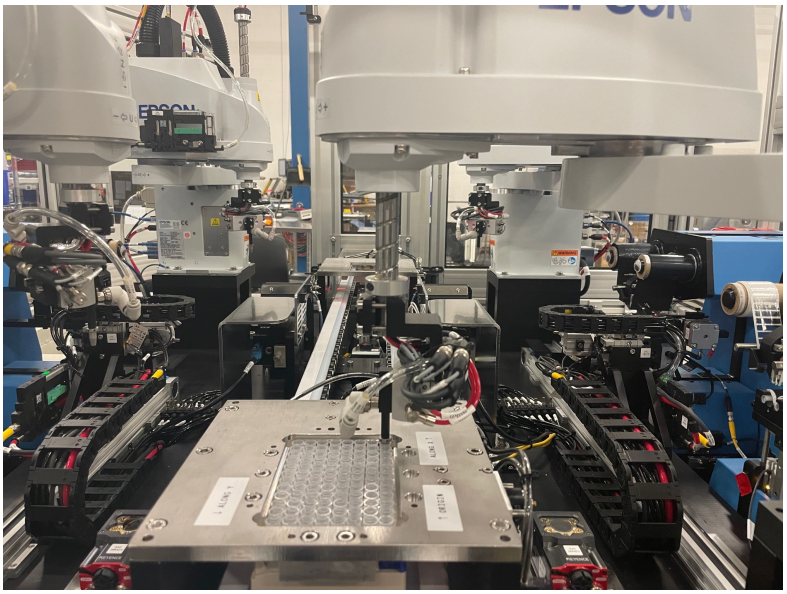
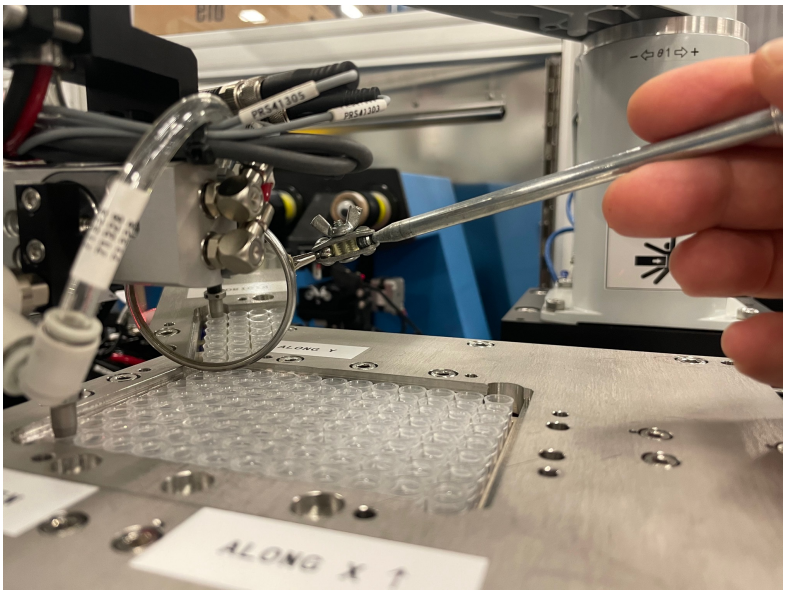
- SAM JOHNSON, ENGINEERING MANAGER, PAR SYSTEMS





Designing the Workflow

Farber says the team designed a machine workflow as follows:

- An Epson SCARA robot picks a vial out of a 96-vial pallet
- The robot passes the sticker on the bottom of the vial over a barcode reader
- The PLC passes the barcode data to the printers
- The robot flips the vial horizontal and then places it on the first printer, which prints the white bar on the side
- A servo system moves the vial to the second printer, which prints the barcode and number
- A second Epson SCARA robot picks the vial out of the printer and brings it to a vision inspection station
- The robot then either scraps the product if it fails vision or places it in the outgoing 96-vial pallet

“We estimated the workflow cycle time at about four seconds total,” Farber explains. To achieve the required two-second output, the design team mirrored the operation in the work cell using two more robots and two more printers. “We’re picking out of both sides of the pallet, and both sides of the machine do the same thing.”

A traditional servo gantry was not a viable option. “Here we have a matrix of 96 vials, so we would need at least a 3-Axis gantry just to do the picking — and a fourth axis to swivel the vials for printing,” Farber recalls. “There was no way we could build a 4-Axis gantry even for the price of a G-Series robot. Even then, it would be a lot easier to build the machine with robots than anything else that might do the job.”

“There’s a cliché in engineering,” Johnson adds. “On a project you have schedule, quality, and budget. Pick two.’’ Utilizing Epson T3 robots as part of the solution, the team came close to achieving all three. The final output cycle time was 2.3 seconds, the machine was delivered nearly on schedule despite being designed and built in the first months of the Covid pandemic, and the project met the customer’s budget.

An In-House Control Interface

Johnson says that in this project, as in most projects the PAR Automated Assembly team does, the robots are controlled solely through the PLC. Engineers, technicians, and operators only work with the FactoryTalk View HMI.

“We’ve written an Allen-Bradley Add-On Instructions (AIO) for Epson, and we’ve developed an HMI faceplate,” he says, “so that when a project comes along where Epson will be a good fit, we already have PLC and HMI controls for that robot. It's really nice because an engineer can go out and see the same code base controlling different machines at different customer sites.”

“The team has also created manual controls in FactoryTalk® View,” Johnson adds. “You just bring up our screen, hit maintenance, and you can see everything you need from the actuators, boxes, planes, and tools, as well as the robot manager.”

Using the environment, service technicians can do everything they need from the machine HMI or a tablet, rather than bringing a laptop computer. “If you’re in a clean room, with gloves on, you don’t want to be messing with a keyboard or mouse,” he explains.

This interface is not a programming environment, but it’s used in day-to-day operations. “I can’t factory calibrate a robot this way,” Johnson says, “but anything in normal operations is going to come through our interface.”

“Epson RC+ is the easiest (programming environment) to use by a significant margin.”

- SAM JOHNSON, ENGINEERING MANAGER, PAR SYSTEMS

Great Software and a Deep Portfolio

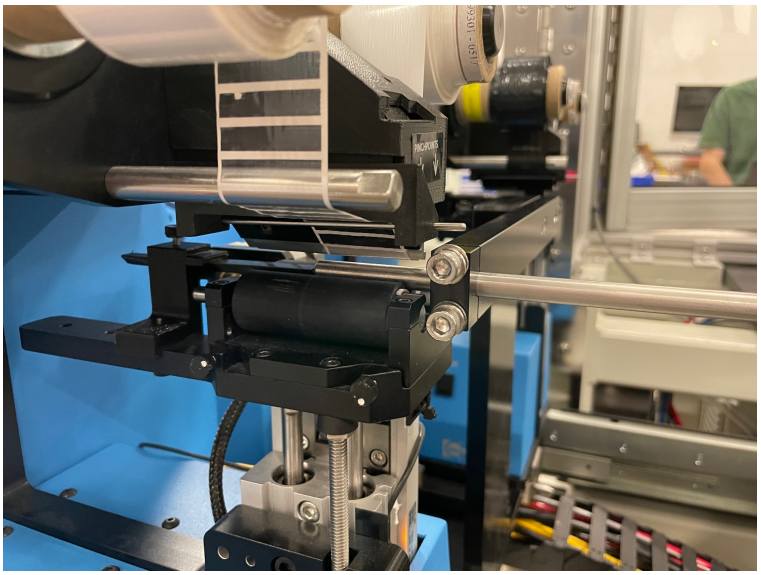
Johnson says there are two crucial reasons the team prefers Epson robots whenever their payload and reach fit within the parameters of an automation project.

“Number one is the programming environment. Epson RC+ is the easiest to use by a significant margin.”

“Number two is that Epson offers a deep portfolio of models and configurations,” he adds. In the case of the labeling cell, the PAR team would have been able to switch quite easily from the Epson T3 to the G3 should the client have opted for a faster output.

“Contrast that with other robot manufacturers, which may have the heavy payload and high performance we need for a particular job, but in only two or three reaches.”

For both of those reasons, Johnson adds, “this project was a great fit for Epson.”



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