

Case Study: Tommy Gate/Woodbine and Genesis Systems
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Tech Cell: Robotic Welding

Auto weld that ends well

Manufacturer of Tommy Gate liftgates for trucks finds success with robotic welding

By Dan Davis, Editor-in-Chief

Three years ago Peter Dunlop, production supervisor for Tommy Gate Co./Woodbine Manufacturing at the time, and Andrew Fitzgibbon, a manufacturing engineer, asked themselves a question that many metal fabricating operations eventually get around to: Will robotic welding work for us?

Robotic welding is nothing new. Go to any FABTECH® International & AWS Welding Show, and you'll see several workcells that are designed to be delivered with a forklift and set up to weld in no time. The technology is tried-and-true, and the programming becomes more user-friendly with each passing year.

The question is more of an introspective one and might be more accurately asked another way: Did the Woodbine, Iowa-based manufacturer of liftgates for trucks have enough volume to justify the cost of an automated system?

"We are low- to medium-volume and have a slightly higher mix than what you would see with other applications," Fitzgibbon said.

The Part Defines the Need

Tommy Gate did have a part that was certainly a great candidate for a robotic welding cell, and the company produced about 50,000 of those component parts a year.

The part in question was a lift arm that can be found on most of the company's liftgates. Each liftgate has four arms, two on each side. The liftarms "scissor up and close" when the gates are raised and extend out when the gates are lowered, according to Fitzgibbon.

The liftarms themselves simply are a mild steel bar with two metal collars that are gas metal arc welded to the opposite ends.

"In order for the liftgate to function properly, the length of those arms is very important, and they must be produced consistently," Fitzgibbon said. "It's also important that the welds on those arms are consistent for safety reasons."

So the 50,000 parts in question weren't identical. The parts' lengths varied as much as the different makes and models of trucks that might carry a Tommy Gate liftgate.

Additionally, the welder dedicated to joining these lift arm components was doing this tedious welding job all day long. In fact, the volume had grown to the point that it was actually starting to dominate the time of another welder as well.

Lots of similar but slightly different parts; components that required high-quality and consistent welds; and removal of repetitious job from an employee's to-do list—the motivations for looking at an automated welding cell were right in front of Dunlop and Fitzgibbon as they examined the production practices behind creation of the lift arms. The part defined the need.

The Genesis of a Solution

The part didn't designate a vendor for the robotic welding cell, however. That's why the Tommy Gate team hit the road.

They talked to different system integrators with experience in welding automation and who happened to be located in the area. They also talked to other metal fabricating operations that had invested in welding automation.

“That was a very worthwhile experience, primarily as we started narrowing things down and started shopping hard,” Fitzgibbon said.

Upon talking with others, the Tommy Gate team came up with two requirements for any system or vendor it would consider:

1. The welding automation supplier had to be savvy about fixturing, because Tommy Gate wanted the ability to swap out fixtures easily. The company realized it couldn't keep the robot busy over one shift with just the lift arms, so an operator's ability to reconfigure fixturing in a quick and simple manner would provide for much-needed flexibility on the shop floor.
2. The vendor had to provide good customer service. Tommy Gate operated several CNC machine tools, such as its turret press, but this was its first foray into the world of robotics. As a result, Tommy Gate wanted someone to lean on when ramp-up time came.

The search led them to nearby integrator Genesis Systems Group, Davenport, Iowa. The company had a track record of successful installations that the Tommy Gate team verified with their field visits.

Fixated on Fixturing

Bill Reid, Genesis Systems' industrial business development manager, said the Tommy Gate product was an interesting challenge.

“For people that weren't familiar with their products, you wouldn't have an appreciation for the tolerancing. But their tolerancing was extremely tight,” he said.

A year after Dunlop and Fitzgibbon began asking the automation question, Tommy Gate had its welding cell—a Versa RC3(L). The patented cell design has a robot centered in the middle of an H frame that holds the welding fixtures. The H frame oscillates 180 degrees, so that the operator can unload and load parts while welding is done simultaneously on the other side of the safety curtains.

The positioners feature a 72-inch tooling length. A Lincoln Power Wave® 455 provides the GMAW muscle. A reamer and antispatter sprayer for the torch help to keep the cell up and running.

The partnership proved very fruitful when it came to fixturing. Tommy Gate had experience designing modular tooling for its families of parts. Genesis Systems understood what it took to adapt fixturing design for robotics.

“They supplied the tooling,” Reid said, “but what we did then was our engineers and toolmakers looked at it, made some modifications and suggestions, and got approval on the final design. Woodbine then made the tooling and shipped it to Genesis, where we made some more modifications. We then did a runoff at Genesis and then at Woodbine.”

Reid added that Genesis Systems didn’t have to change much. It might have been relocation of a clamp, so it didn’t interrupt the torch movement. It might have been reconfiguring a fixture for better torch access.

Tommy Gate made some changes of its own as well. Because of the high mix of parts that are fed in and out of the cell, some of the plastic walls at the entranceway to the cell were replaced with steel shelving. The shelves contain parts or raw materials, in individual bins, that the operator can access easily to load the fixtures. Also, the 900-lb. welding wire drum is kept on a stand overlooking the welding cell so that clutter can be minimized around the cell.

Question Answered

Two years after the foray into automated welding, Tommy Gate is pleased with the results. Fitzgibbon acknowledged that the cell has justified the company's initial investment—even though it is operating for only one shift per day.

“Since the first day the robot was installed, screwed to the floor, and turned on, we were welding parts. Fundamentally, there was no downtime, which was extremely positive,” he said.

Tommy Gate has figured out its fixturing approach to the point where it now can have up to nine different fixtures mounted to the machine at any one time. It also spends more time on keeping the cell and fixtures clear of residue buildup, which helps the robot run at peak efficiency.

A former welder tends to the automated cell and helps to keep the jobs on track.

“This is his baby now. He runs it and runs it well,” Fitzgibbon said.

The Tommy Gate team now has a new question: What's next?

The company has room for expansion in terms of robotic welding. It's just a matter of targeting those welding jobs that make the best candidates for automation, freeing up the company's 25 welders to tackle less repetitious and more challenging jobs.

“With the success of this, other concepts that may be slightly more involved from a tooling standpoint, slightly more complex, become feasible and up for discussion,” Fitzgibbon said. “It really has opened eyes and some doors for us potentially in the future.”

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Captions...

(roboticwelding-overview-woodbine)

The robotic welding cell Tommy Gate Co. installed two years ago has a footprint roughly
20 feet by 20 feet.

Alt tag: The robotic welding cell doesn't take up too much room.

(roboticwelding-fixtures-woodbine)

Among the changes Tommy Gate made to the Genesis Systems welding cell was adding
shelving near the welding tables for quick changeout of fixtures.

Alt tag: The welding cell operator changes out a fixture.

(roboticwelding-robot-woodbine)

Designing fixtures for a robot takes a slightly different mindset than designing for a manual welder. For example, a fixture in a certain position may be in the way of a welder's reach, but wouldn't interfere with a robot's welding path.

Alt tag: A welding robot goes where a welder's arm couldn't reach.

(roboticwelding-mezzanine-woodbine)

Tommy Gate decided to place the bulk wire atop a shelving unit, freeing up space below.

Alt tag: Bulk wire sits above the welding cell.