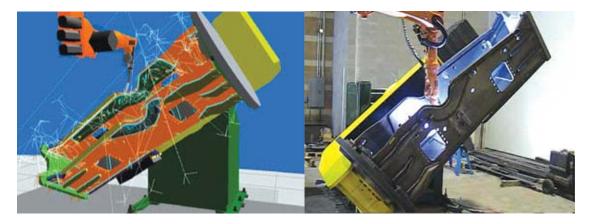January 2009

Technology Focus

This section was edited by Associate Editor Alan S. Brown.

ROBOT EXCELS AT LOW-VOLUME ASSEMBLY

Everybody knows that industrial robots boost productivity, but only if you do the same sequence of high-volume tasks over and over again. Now, SmartTCP Inc. of Farmington Hills, Mich., has introduced a robot designed specifically for low-volume production.

"When this thing is on its game, it's absolutely phenomenal," said Tim Bowen. Bowen is production manager at NPK Construction Equipment Inc., in Wickliffe, Ohio. The company makes a family of mounting brackets for hydraulic hammers used in demolition and excavation.

Some of those brackets have as many as 150 weld seams. It took anywhere from 20 to 27 hours to weld one of NPK's largest brackets manually, including mounting, dismounting, and repositioning. SmartTCP does the job in 7.5 hours and leaves Bowen impressed with the quality of the welds.

A new robot developed for low-volume applications programs itself within hours using a CAD drawing, then welds the final part.

The problem with robots for short-run production has always been setup. Engineers teach robots how to weld by moving a pendant over a part to show the robot where to position itself, then check, double-check, and reprogram to improve precision. When Bowen was shopping for a robot, integrators told him that it might take two months to program a robot to make a complex mounting bracket. "There was just no way," Bowen said. "The robot would be sitting idle, not producing a single part, while we were teaching it."

SmartTCP does its programming offline, so while the robot is making one part, the welder is programming the next one on the computer. This is possible because SmartTCP can analyze any weldable geometry in a CAD drawing, analyze it, and create its own welding path, according to SmartTCP's CEO, Efi Lebel.

"If it's a really complex piece, the software will get it 90, 95 percent right. Sometimes there's a narrow space where the robot cannot fit physically, or the system will specify a half-inch weld and you want a five-eighths-inch weld. But we do all the programming offline and you can make any changes in the software. It's very visual, and it can be done by a welder, not a programmer," Lebel said.

Bowen agrees. "The robot gets it right about 90 percent of the time, and takes only a few hours to define the rest of the program," he noted.

Lebel has a very different philosophy about programming robots: "It's like when you take a young guy and teach him to drive. You don't teach him to ride from point A to point B. You teach him to accelerate, brake, and turn. That's exactly what we do. Instead of teaching the robot to weld a specific part, we educate it on how to weld in a specific environment, so it knows what to do when it sees a certain geometry and material in a CAD drawing."

Lebel uses off-the-shelf hardware to build his robots. Although he prefers Kuka robots, he works with other automatons as well. The company's base unit consists of a gantry-mounted 9-axis robot, and a typical installation will use a 12 or 13-axis robot. The company has built gantries as long as 100 feet for fabricating structural steel.

"Because we use off-the-shelf equipment, we don't have to build the system in our facility and then ship it," Lebel said. "The first time we build it, we build it at the customer's site. We can build a system in three weeks and have it working in five weeks. We also offer a one-year guarantee on programming, so if there is a problem getting the robot to build something, we will go over the problem with you, find out what went wrong, and then show you how to do it."

Prices for SmartTCP start at $500,000, but the average system runs about $700,000. According to Lebel, the company has sold eight systems so far. It is focusing on heavy industry and companies that fabricate steel beams, girders, and joints for the construction industry.