

Robotic Revelations

BY GEOFF WEISENBERGER



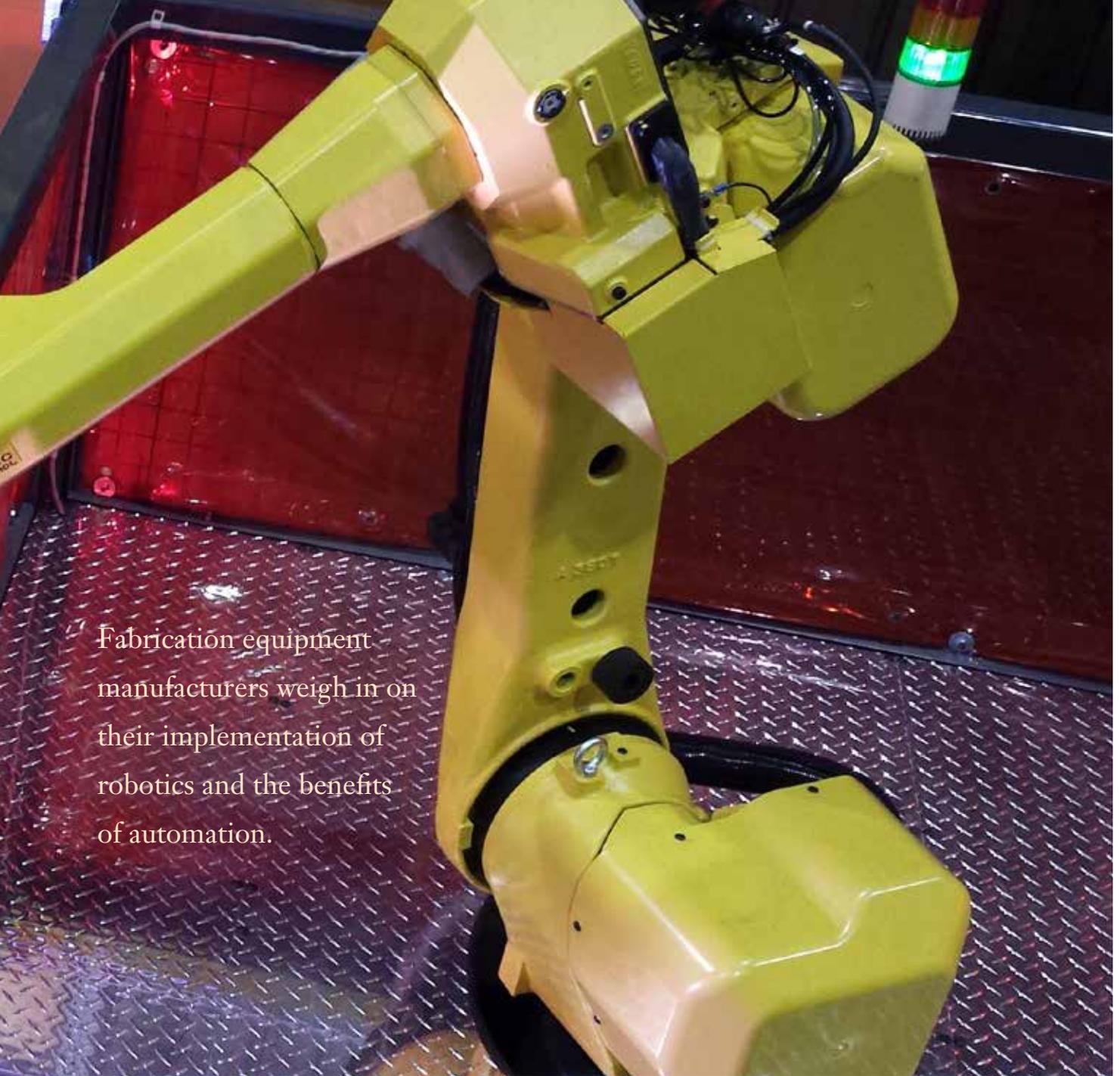
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ROBOTIC PRODUCTION HAS long dominated many manufacturing industries but has been less common in structural steel fabrication shops, typically due to the customized nature of steel framing projects.

Still, its use in the structural steel industry has increased in recent years as shop management has looked to automation to address a couple of key issues: 1) fabricating jobs faster and with more efficiency and 2) a shortage in skilled labor. We recently asked representatives from several shop equipment manufacturers—AISC members and/or 2019 NASCC: The Steel Conference exhibitors—their thoughts on robotics and automation:

How has robotics/automation influenced the design of your equipment? In which area of the fabrication shop do you see robotics having the biggest impact?

Daito USA: Daito was one of the first manufactures to build a plasma robot for the structural steel industry, and showed its first plasma robot, the CR4816, at the 2005 Steel Conference in Montreal. The plasma robot has become a key piece of equipment for all of our steel fabricating customers, either as a standalone machine or an



Fabrication equipment manufacturers weigh in on their implementation of robotics and the benefits of automation.

addition to any beam line system. The biggest impact is on production—more production without the backbreaking task of doing everything by hand. And in areas where finding good employees is difficult, the plasma robot can help with production while keeping a lean crew.

Voortman USA: Automation has totally changed the way we process steel in the modern structural fabrication shop. The days of needing a person at each machine are long gone with the onset of automation and real-time tracking of each piece as it is processed to the production control system. A complete line such as a shot-blaster, layout/drill/saw machine with a piece removal system, a robotic cutting system and a robotic welding cell can be achieved with only three operators.

Burnco and Prodevco Robotic Solutions, Inc.: The robot is at the center of our design, and it has always been our objective to implement current robotic developments and accessories as much as possible. Our Prodevco equipment is based on a six-axis

industrial robot with a seventh auxiliary axis, requiring very little maintenance in a very dusty environment, compared to linear axis equipment. The robots minimize the number of components, thus improving reliability. There have also been significant advances in vision and non-contact sensing, which improves accuracy and reduces maintenance requirements.

AGT Robotics: As a robotic integrator, the biggest impact we see in fabrication shops is with welding applications. Historically, robots were exclusively used for large-volume productions (mainly automotive) but now a lot of smaller fabricators can also use robots for their production. It helps them to stay ahead of their competition and overcome the fact it has become more and more difficult to find welders.

Peddinghaus: The introduction of robotic technology for the fitting and tacking of structural steel components has been pivotal for today's fabrication shops. The position of a fitter is one of the most skilled roles in a shop, making it one of the hardest

areas to find qualified employees. The PeddiAssembler system has successfully alleviated the challenges our fabricators face due to a reduced workforce, and it continues to increase their tonnage outputs.

What new or emerging equipment technologies have you seen that you think would benefit steel fabricators?

Voortman: The largest impact for fabricators going forward will be robotic welding capability, which has been pioneered by European manufacturers for structural steel shops. A large part of the capability of these systems is tied to the software. If the welding information isn't in the 3D model, you have to manually enter data. In such a scenario, you have changed your weld-

ers into programmers, thus nullifying the gains in labor efficiency. Software is also key when it comes to probing or sensing capabilities. The system needs to know all the characteristics of each piece due to mill tolerance issues such as toed-in or toed-out flanges, off-center webs or deviation in the plate that is to be welded. All of these issues have to be addressed before the robot can perform the weld. Laser capture is another technology that addresses mill tolerance issues, but it is affected by various surface conditions, so I would say this is still work in progress.

Burnco/Prodevco: In addition to advances in robotic plasma cutting, another emerging trend is the introduction of robotic fitting and welding systems, though these integrated systems are very com-

plex and can be cost-prohibitive for many fabricators. Our system allows for 360° scribing/layout in two work zones, which significantly reduces the fitting workload. Typically, fitting and layout are the bottleneck in many shops, so fabricators can greatly benefit from this feature.

AGT: Lots of technologies are now improving to make robots more flexible and adaptable, such as seam-finding and tracking methods. Programming methods for industrial robots are also evolving, and off-line programming software packages are continuously improving and making it easier for end users to program their own robots. At AGT, we even pushed it further and made a system for structural steel fabrication where we automated the process of programming, meaning that programs are auto-generated

Something New, Something Old

While automation clearly has its advantages, most fabricators don't boast a shop full of robotic solutions up and down the production line. We asked attendees of AISC's Future Leaders Ideas Lab (FLIL) about their most recently purchased equipment as well as their old favorites (FLIL is designed for representatives of AISC full member fabricators who have either recently moved into or anticipate moving into a senior management position during the next few years). Here's what we heard:

Owen Parrish, PE, production manager, NAFCO

New equipment: The Peddinghaus PeddiWriter. It performs layout of connection material on each piece and significantly decreases the amount of time that each piece spends in fitting, as well as increases fit-up accuracy.

Old favorite: We use our old track burner for a little bit of everything: beveling, splitting tees, preheating and cambering. It's a tool with a lot of uses when newer or more conventional equipment can't be used.

Jacob Moore Perrin, sales manager, Owen Steel Company, Inc.

New equipment: Kinetic plate machine. It processes up to 8 in. material for the shop.

Old favorite: A double-end mill of unknown make. It allows us to mill any size piece at both ends at the same time.

Darrin Kelly, PE, executive vice president and general manager, DeLong's, Inc.

Recent equipment: Controlled Automation Flange Drill. We used to sub-drill splice plates and then drill them full-size in laydown assembly with manual air drills. We now drill through the solid in laydown assembly with this CNC drill. Less piece fabrication and much faster, more accurate drilling.

Old favorite: A twin-head submerged arc welder with a tractor drive. It accomplishes flange-to-web welds for girders, both flanges at once.

Greg Rajek, Merrill Steel

New equipment: Zeman Steel Beam Assembler. It has the capability to fit and weld assemblies. It has placed more labor demand in the office (programming) but has saved labor in the plant.

Old favorite: Plate shear machine. This is a very reliable machine that can quickly cut plate down to size. We primarily

use it for backing bars and runoff tabs for CJP welds (most of our plate is processed on the burn table or plate processor).

Ryan Ayesh, general manager, Metal Pros, LLC

New equipment: Ocean Avenger Beamline. A typical stair stinger that would take 75 minutes to layout and mag drill by hand is reduced down to less than 10 minutes.

Old favorite: Our radial arm drill press. It can handle drilling 3-in.-plus holes when needed.

Darren J. Cook, vice president, Texas Division, Steelfab

New equipment: Peddinghaus PeddiWriter. It basically lays out the detail on a main member as well as puts part numbers and weld symbols on the member. This saves time for our fitters as they spend less time measuring and laying out pieces. It also reduces errors as it takes some of the human element out of the process.

Old favorite: Our oldest piece of equipment is probably an old Iron Worker. It's good for making small parts as you can shear and punch without having to program and set up a machine. It is especially useful for shop orders; a lot of times those are just one or two pieces, and it is counterproductive to stop a big machine from making parts for small orders like this.

Nathan Michael, operations manager, Zalk Josephs Fabricators, LLC

New equipment: Our recent shop overhaul implemented a FICEP automated handling and processing system, which includes: a shot blaster, two Endeavor Drilling centers, a robotic copier, a miter saw and over 500 ft of rollers for transferring the steel through the system and into the fabrication areas. While labor needs on every project are different, on average this system helped us reduce our man-hours per ton by almost 30%, as well as increased safety when it comes to material handling.

Old favorite: The oldest piece of equipment we use is the Behringer Saw. We keep it around because it can cut through anything, given enough time. This is the saw we used to cut the 36x924 wide-flange beams used on the 150 N. Riverside project in Chicago (for more on this project, see "Above and Beyond" in the July 2017 issue at www.modernsteel.com).

by software, without human intervention. I personally think the future of robotics doesn't necessary lie in the robot itself, but rather in the software that controls it.

Peddinghaus: The use of camera systems and scanning technology is consistently being enhanced. This allows for structural shapes to be recognized and assists the software with determining the optimum robotic movement to efficiently produce a finished product.

Have you recently introduced anything new in terms of robotics that advances the industry?

Daito: The new DCM1050 is high-speed carbide drilling, layout marking and plasma robot, allowing fabricators to save space while maintaining all the benefits of drilling, layout marking and plasma cutting in one machine.

Voortman: At The Steel Conference in St. Louis, we will be introducing the new Voortman V631 drilling system with integral layout marking, web support and milling capability. The machine can also be incorporated into the Voortman MSI system to reduce labor content.

Burnco/Prodevco: Our systems ability to process round tube on the Prodevco PCR 42 robot cell has been improved, and fabricators can take advantage of seamless production of all structural shapes. The recent integration of the Hypertherm XPR 300 has allowed some of our specialty fabricator customers to now process stainless and aluminum shapes.

AGT: Our BeamMaster Weld is constantly improving, especially in terms of software. The auto-generation of programs is always getting better.

Peddinghaus: There is always something to see in our booth at The Steel Conference when it comes to new technologies! PeddiAssembler robotic fitting and welding systems are in U.S. and Canadian shops and are working accurately. Come see us in St. Louis to set up an on-site demonstration. ■

Answers were provided by the following manufacturer representatives:

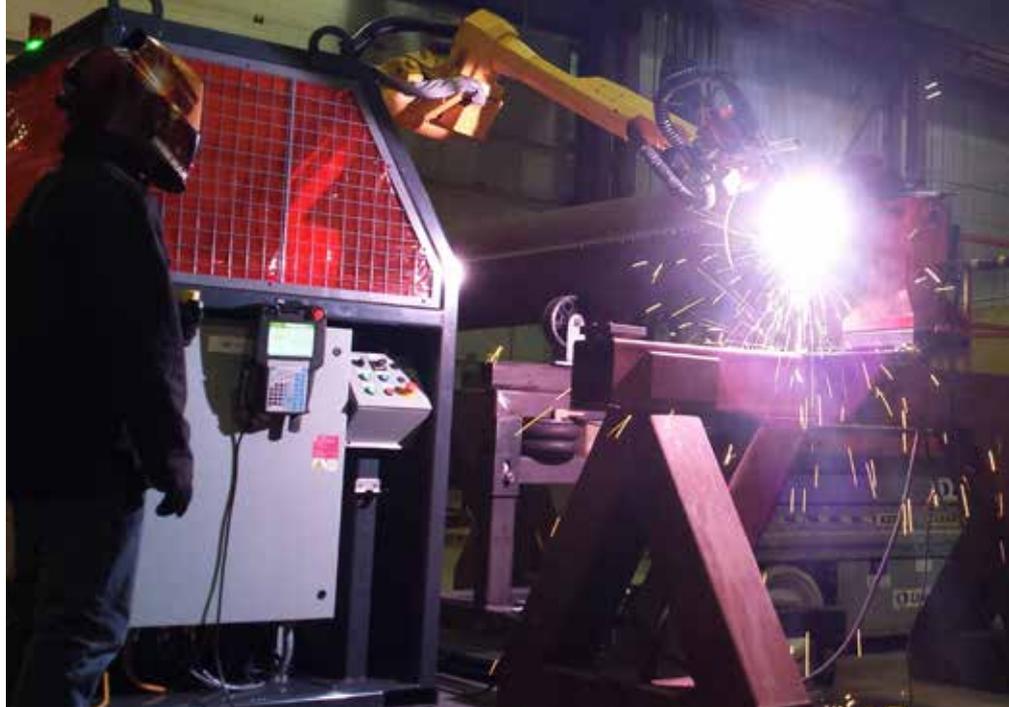
AGT—Denis Dumas, marketing manager

Daito USA—Christian Prouty, sales manager

Burnco and Prodevco Robotic Solutions, Inc.—Marc Jobin, general manager and technical engineer

Peddinghaus—Todd Cordes, international sales manager

Voortman USA—Adrian Morrall, president



AISC Member Equipment Manufacturers

Here is a list of equipment manufacturers that are AISC members and/or 2019 NASCC: The Steel Conference exhibitors. For more on The Steel Conference, including a full exhibitor list, visit www.aisc.org/nascc.

	AISC Member	2019 NASCC Exhibitor
AGT Robotics		Yes
Akyapak USA	Yes	Yes
Automated Layout Technology, LLC		Yes
Combilift Ltd.	Yes	Yes
Controlled Automation, Inc.	Yes	Yes
Cosen Saws	Yes	
Daito USA, Inc.	Yes	Yes
Davi, Inc.	Yes	Yes
Electro-Mechanical Integrators, Inc.		Yes
Ercolina - CML USA, Inc.		Yes
FICEP Corporation	Yes	Yes
Hypertherm, Inc.	Yes	Yes
Inovatech Engineering Corp.	Yes	Yes
Kinetic Cutting Systems, Inc.	Yes	Yes
KMT Waterjet Systems		Yes
Koike Aronson, Inc.		Yes
Kranendonk Production Systems BV		Yes
Lincoln Electric	Yes	Yes
Machitech Automation	Yes	Yes
Miller Electric Mfg., LLC	Yes	
Ocean Machinery, Inc.	Yes	Yes
Pacific Press Technologies	Yes	Yes
Peddinghaus Corporation	Yes	Yes
Prodevco Robotic Solutions	Yes	Yes
PythonX, A Lincoln Electric Company		Yes
ROUND0		Yes
Trilogy Machinery, Inc.	Yes	Yes
Voortman USA, LLC	Yes	Yes