SUCCESS

LINCOLN ELECTRIC
THE WELDING EXPERTS℠

WAVEFORM CONTROL TECHNOLOGY®

TOTAL s2f™

Aluminum

Wing Enterprises, Inc.

This Springville, Utah manufacturer of Little Giant® aluminum ladders invests in welding automation to speed production and reduce post-weld cleanup operations.

-CHALLENGE-

A dramatic sales increase required new production methods to meet demand for Little Giant® ladders.

-SOLUTION-

TOTAL s2f™ (Start 2 Finish) Nextweld® aluminum welding solution:

- Lincoln robotic cells equipped with Power Wave® 455M / Power Feed™ 10R welding systems.
- Lincoln pulse waveforms enhanced with premium aluminum starting, welding and ending.
- Lincoln SuperGlaze® 5356 aluminum MIG wire delivered in recyclable 200 lb. Accu-Pak® boxes.

-RESULTS-

Productivity jumped 25-30% and post-weld spatter-removal operations were virtually eliminated.

LINCOLN ELECTRIC NEXTWELD®

What started 32 years ago as a small family business, building and selling a new brand of adjustable ladders, eventually stalled from an expired patent and the effect of competing brands offered at big-box retailers beginning to spread across the American landscape.

Selling premium ladders one and two at a time at trade shows and county fairs was proving to be a far less aggressive sales strategy than required to maintain and grow the company. So, when Hal Wing's family business first aired a televised infomercial, sales at the Springville, Utah, company took off. The staff was quickly bolstered from a dwindling 20 people to more than 400.

To keep up with demand, Wing Enterprises needed to increase production of its Little Giant ladders. New robotic welding cells from The Lincoln Electric Company helped with the additional work.

Productivity, using the automated welding cells, jumped 25 to 30%, said Brian Nielson, an automated fusion technician with Wing.

"These robots have been great," Nielson said. "They produce a lot cleaner and more consistent weld than manual welding, and they'll run around the clock. Lincoln was great at helping us get started."

Sales continued to rise as the infomercials for the versatile ladders repeated on the airwaves. Now, two years after the company's first television campaign premiered, sales have more than tripled, and the company plans to build a new facility three times its original size equipped with more Lincoln robotic welding cells. The big-box retailers, which once threatened the company's existence with foreign production, now are placing orders of their own to meet their customer requests for Little Giant ladders.

However, Wing's experience with

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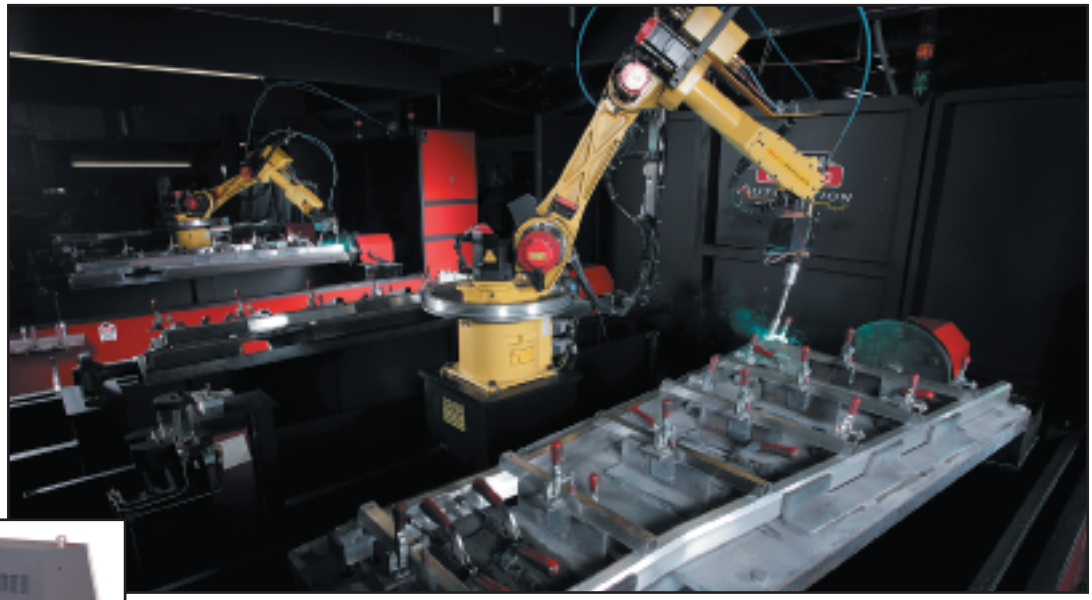
automated welding has not been all good. A few years earlier, Wing fabricators experimented with another brand of robot and welding equipment. A series of unresolved problems stalled the company's production to a near standstill, and Wing was forced to return the equipment to the manufacturer.

So when the need for robotic welding resurfaced, Wing technicians reluctantly moved forward. "These machines are very forgiving," Nielson said. "We rarely have problems now."



Today, Wing uses six Fanuc® ARC Mate® 100iB robots, each equipped with a Lincoln Power Wave® 455M, a digitally-controlled inverter welding power source. The unit can be networked with robots and other shop equipment through Ethernet connections. Production Monitoring™ software from Lincoln can be viewed on PCs through wired, or even Wing's wireless network, throughout the plant.

Lincoln's Waveform Control Technology® and easy to use software, all Lincoln Nextweld® innovations, allows Wing employees to program their own waveform, or choose from more than 100 standard welding waveforms pre-loaded into the Power Wave power sources to optimize penetration, deposition, bead shape, travel speed and other variables.

Wing MIG welds 6005-T5 aircraft aluminum from 1/8- to 1/16-inch thick using Lincoln's TOTAL s2f™ aluminum welding solution which includes the pulse welding mode. The term TOTAL s2f™ (Start 2 Finish) is used by Lincoln to reflect recent R&D development work on the complete aluminum arc welding solution. It combines the elements of optimized welding waveforms, which run on advanced welding equipment, and includes the best aluminum consumables, to deliver a total welding solution. Especially applicable to robotic welding applications, TOTAL s2f™ innovations work to deliver stable, consistent arc starting, clean, controlled weld bead appearance, improved crater fill to minimize crater cracking and wire end conditioning to deliver an excellent start on the next weld. Wing performs tens of thousands of extremely short welds on their ladders each day. Consistent starting and stopping is key to maintaining quality and extending welding torch consumable life. Recent twist break tests of Little Giant ladders confirm that the welds are the strongest link in the assembly.

The welding wire consumable is Lincoln SuperGlaze® 5356 3/64-inch aluminum wire used with 100 percent Argon shielding gas. The company uses a wire speed of 300 inches per minute for both the first pass and for the second, final cap pass to achieve outstanding weld appearance.

Nielson noted the water-cooled ServoTorch on the Fanuc robot stays cool and the Lincoln wire drive system does a great job of guarding against birdnesting, or wire tangling, common to aluminum welding, he added. "You can use the torch for hours and it never gets too hot to handle it," he said. "Learning to use this equipment was pretty simple. With Lincoln's training classes in Cleveland and an around-the-clock technical staff, adapting to this system

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has been excellent. The initial issues we experienced were resolved quickly and effectively, and that was a very good experience for us considering the issues we had on other equipment."

Nielson said that the support technicians from Lincoln keep up to date on the specifics of Wing's operations and can readily offer assistance with a quick call. Kurt Spencer, a Lincoln sales representative for Wing, said the support staff continually works with customers to improve productivity.

"We're always looking to refine the software to control the peak current," he said. "But we can do a lot with the welding wave shape, such as program it for less spatter and greater stability. Stability is particularly important for aluminum."

Wing produces about 12 different models of the aluminum ladders that range in price from $100 to about $800 with a variety of accessories, such as scaffolding and work platforms.

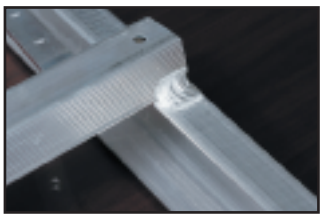
In all, Wing manufactures about 1,500 ladders per day in a 10-hour shift. The robots are dedicated to fabricating the company's most popular models in the $300 to $400 range. The robotic cells turn out approximately a combined 450 ladders per day. And, with two new cells on the way, that total is expected to jump to roughly 650.

The output varies based on the variety of ladder configuration; Nielson said each robot makes about 24 welds on each ladder and produces approximately 100 units a day. A major contributor to increased productivity, he said, was that ladders made with the automated welding cells do not require post-weld spatter clean-up operations.

"There really is no spatter from the robots," he said, "not anything like the manual welding."

As Wing continues to grow, its managers have struggled to find qualified welders to staff its operations. Switching to welding automation has created jobs for skilled welding technicians responsible for several robots as well as for employees that perform part loading / unloading and visual inspection operations.

The welding cells were designed with two symmetrical work tables and fixtures – one for welding and the other to load and unload parts. A screen at each end blocks the arc light rays, and a 200 lb. Lincoln Accu-Pak® recyclable cardboard box package is used to feed the aluminum welding wire through conduit over the fence to the welding drive system and ServoTorch.



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Lincoln's latest Power Wave 455M, along with the Power Feed 10R industrial wire drive, form the heart of the welding hardware in these workcells. These systems are capable of multi-process welding, including MIG and cored wire DC welding on steel, stainless steel, aluminum and other alloys.

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While Wing enterprises has not needed to utilize its Lincoln Power Waves to their full capacity, the flexibility and versatility allows the company to move in directions and grow without reinvesting substantial capital in new equipment.

"We've been very pleased with this equipment and especially with Lincoln's service," Nielson said. "When you make this kind of investment in advanced welding technology, you really need the support to back it up. Lincoln provides that support, and they do it well."

Featured Lincoln Products

Power Wave® 455M
Superior Arc Performance. Revolutionary Communication.
For welding thicker materials in robotics, hard automation and semiautomatic applications, choose the Power Wave 455M. This model features Waveform Control Technology® for superior arc performance on a variety of materials, including steel, stainless steel, aluminum and nickel alloys, and delivers custom control of the arc for each wire type and size for consistent welds time after time. The Power Wave 455M is designed to be part of a modular, multi-process welding system in which power sources can be added or removed to create a series of highly integrated and flexible welding cells.

SuperGlaze® 5356 in 200 lb. Accu-Pak® Boxes
SuperGlaze 5356 is a great general purpose filler alloy designed for the welding of 5XXX series alloys when 40,000 psi (276 MPa) tensile strength is not required. It features a superior wire surface finish for optimal feedability and arc performance. Lincoln's propriety manufacturing process is designed to precisely control chemical composition.

WHAT IS NEXTWELD?

The challenges facing industrial fabricators today are increasingly difficult. Rising labor, material, and energy costs, intense domestic and global competition, a dwindling pool of skilled workers, more stringent and specific quality demands.

Through our commitment to extensive research and investments in product development, Lincoln Electric has established an industry benchmark for applying technology to improve the quality, lower the cost and enhance the performance of arc welding processes. Advancements in power electronics, digital communications and Waveform Control Technology™ are the foundation for many of the improvements.

NEXTWELD brings you a series of Process, Technology, Application and Success Story documents like this one. NEXTWELD explains how technologies, products, processes and applications are linked together to answer the important questions that all businesses face:

- *How can we work faster, smarter, more efficiently?*
- *How can we get equipment and people to perform in ways they've never had to before?*
- *How do we stay competitive?*

NEXTWELD is the future of welding but its benefits are available to you today. Ask your Lincoln Electric representative how to improve the flexibility, efficiency and quality of your welding operations to reduce your cost of fabrication.

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