SUCCESS

LINCOLN ELECTRIC
THE WELDING EXPERTS

WAVEFORM CONTROL TECHNOLOGY™

Surface Tension Transfer® (STT®)

STT on Sheetmetal

Saginaw Control & Engineering, Inc.

Lincoln's STT process cut welding time by 75% on some welding operations.

-CHALLENGE-

Saginaw Control & Engineering sought to automate welding operations to boost production while maintaninig quality in areas using the TIG (GTAW) process. Similarly, they hoped to automate MIG (GMAW) welding operations and reduce spatter cleanup, previously taking up to 30 minutes per part to remove.

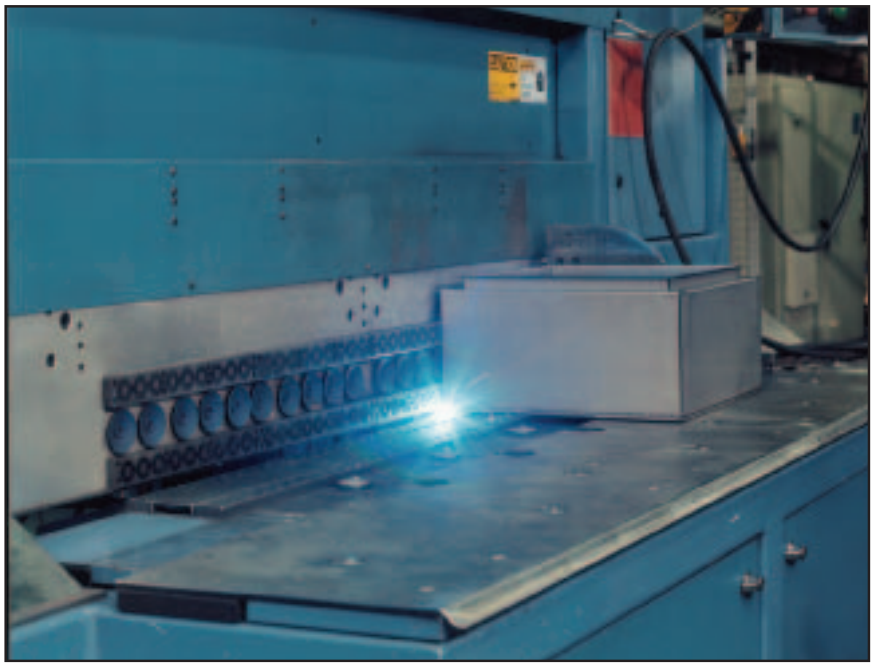
-SOLUTION-

Surface Tension Transfer® (STT®) process, a Lincoln Electric Nextweld® technology.

-RESULT-

Use of the Lincoln STT® (Surface Tension Transfer®) process has enabled the installation of an automated production line, resulting in enhanced productivity over TIG and semiautomatic MIG welding, while creating spatter and distortion-free parts. Finishing time was reduced up to 100 percent due to the virtual elimination of weld spatter.

LINCOLN ELECTRIC NEXTWELD®



As one of the leading electrical enclosure manufacturers in the country, Saginaw Control & Engineering, Inc., headquartered in Saginaw, Michigan, has been able to improve productivity and drastically reduce finishing time by switching from a TIG (GTAW) welding process to an innovative MIG (GMAW) process from The Lincoln Electric Company. The change to the Surface Tension Transfer® (STT®) process, a Lincoln Nextweld® technology, has also enabled Saginaw Control & Engineering to install a new automated production line, further enhancing productivity at this 40-year-old company.

"Saginaw Control & Engineering uses an innovative welding process to increase productivity and dramatically decrease finishing time"

Although Saginaw Control & Engineering had used the MIG (GMAW) process previously in some areas of its plant, the intermittent spatter associated with traditional MIG, as well as the distortion created on thin materials, prevented the company from looking to conventional MIG as a real solution throughout the plant. Saginaw Control & Engineering found that the STT process is able to yield a weld that is consistent and smooth, with

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a cosmetic appearance similar to TIG, but with the added-benefit of increased travel speeds, virtually eliminating spatter and distortion on these enclosure products which house electrical components.

According to Fred May, President and CEO of Saginaw Control & Engineering, creating quality welds is key to the success of the company's product. "In this business, it is imperative to have high integrity welds because many of our electrical enclosures are found in harsh environments. If a weld fails, it could mean potential damage to the very items our enclosures are designed to protect," said May. "It is this high quality that keeps our customers coming back."

Another key to the success of Saginaw Control & Engineering is having flexible equipment. The company manufactures a broad range of products, including more than 1,000 stock parts and hundreds of custom parts. Electrical enclosures can range in size from 4" x 4" to 90" x 200", and be composed of steel, stainless steel, aluminum, galvanized and galvanneal. These products can be found on machine tools and plumbing stations in industries such as automotive, food processing, water treatment, waste treatment and construction/mining. Saginaw Control & Engineering's customer list boasts such well-recognized names at General Motors®, Ford Motor Company® and Siemens®.

Moving to a MIG Process

According to Len Harrington, Fabrication & Weld Supervisor for Saginaw Control & Engineering, the 248-employee company had relied mainly on TIG welding because of the quality it offered. When the company was looking to automate, it began to seek other welding solutions when company officials learned that TIG would not be compatible with the increased production capacity that a production line system would bring.

"We looked into a number of competitive systems, but were most impressed by what STT offered in terms of excellent consistency, good penetration and low spatter," said Randy Pangborn, Second Shift Welding Supervisor, Saginaw Control & Engineering. "Our electrical enclosures are composed of thin materials, ranging from .030" to .250", so we were skeptical of STT at first, but seeing a demonstration on our challenging seam welds and corner welds sold us."

"If it weren't for this consistency, we wouldn't be able to meet this level of production"

Harrington echoes the same skepticism with the STT. "We were surprised by the STT, because we had never been pleased with the results from MIG in the past," said Harrington. "The units we had used were not adjustable, so we had a hard time controlling the arc, resulting in spatter and high spots where the welds started and ended. A great deal of time was spent grinding each weld, making MIG very unproductive for us."

In comparison, the STT power source uses Lincoln's high frequency inverter technology as well as advanced Waveform Control Technology™. With the STT, the electrode current is controlled independent of the wire feed speed. The current is monitored and adjusted hundreds of times per second based on the instantaneous needs of the welding process. For Saginaw Control & Engineering, this ensures a spatter and distortion-free part.

"If it weren't for this consistency, we wouldn't be able to meet this level of production," said Harrington. "The quality is very comparable to TIG. Although we still grind each weld, by using STT, finishing time has been cut dramatically."

"Before STT, we spent from 2 to 30 minutes on each enclosure hand

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removing spatter from those areas welded with conventional MIG," said May. "Now, that step has been drastically cut, leading to a major savings in consumables, abrasives and manpower."

"We get a consistent weld from start to finish, especially on challenging seams, vertical and four-corner welds," noted Pangborn. "In addition, STT is very controllable. We can even change parameters in the middle of a weld."

Welding Stations

Saginaw Control & Engineering's automated fabrication system handles any enclosure material up to 1/8" thick. This system includes the following stations:

Cutting & Folding

The first steps in producing an electrical enclosure are cutting and folding. Flat pieces of steel travel through an automated laser cutting line where holes are made. Next, an automated folding line folds the enclosure to specification.

Seam Welding

At this automated station, an STT power source welds the two seams of each enclosure. To do this, an operator loads and unloads the parts and is responsible for selecting the right program to weld a particular sized enclosure. With a touch of a button, an operator can change parameters on the STT to weld anything from mild steel to stainless.

Four-Corner Weld Station

Here, two STT power sources weld the corners of the electrical enclosure using the STT®-10 Controller. With the STT-10, Saginaw Control & Engineering is able to develop optimal procedures and set the range of operator adjustments to increase or decrease the heat and penetration characteristics without changing the wire feed speed.

Squaring Station

At the squaring station, the enclosure is squared and cut to specified production dimensions to ensure that the enclosure door is able to fit. An Invertec® STT-II power source is utilized in conjunction with an STT-10 to weld the top four corners of the electrical enclosure. Because these corner welds require welding a short distance in each direction, they are challenging welds.

For welding in each station, Saginaw Control & Engineering uses a .035" carbon steel wire. The company uses two different types of shielding gas – either a tri-mix of helium, argon, and carbon dioxide for stainless steel or a mix of argon and carbon dioxide for other mild steel materials.

"In addition, STT is very controllable. We can even change parameters in the middle of a weld."

Grinding & Stud Welding

Before the enclosure is complete, all welds are ground and fasteners for sub panels are arc welded to the enclosure using a stud robot.

Finishing & Powder Coating

The remainder of the finish work is done manually. Operators manning four stations at the end of each automated production line weld the doors onto the enclosure with Lincoln Square Wave™ TIG 175 units. In the last step of production, the electrical enclosures are powder coated to protect them from rust.

The completed electrical enclosure has 14 welds – all are fillets that range in size from 8" to 36" long.

Service

In addition to being pleased with the STT power sources, Saginaw Control & Engineering is also happy with the service it has received from Lincoln Electric and sales representative Geoff Lipnevicius.

"Since we run this equipment 24 hours a day, we need to be able to count on Lincoln," said Pangborn. "With Lincoln, we have answers to questions within an hour, parts shipped the next day, and excellent technical support. We can't say enough about the Lincoln Electric team and how they have serviced us."

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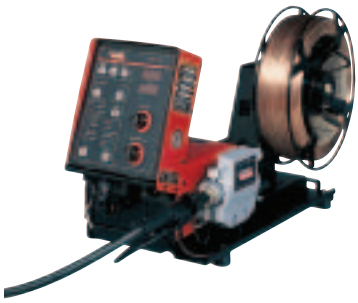
Featured Lincoln Products



Invertec® STT 10
The sophisticated STT-10 Process Controller was designed specifically to work with the revolutionary STT II power source. Its microprocessor controls make the STT-10 easy to develop optimal procedures and set the range of operator adjustments. The STT-10 takes an active role in controlling the power source with a dual procedure control that can increase or decrease the energy in the arc without changing the wire feed speed.

Invertec® STT II Power Source
The revolutionary STT II power source combines high frequency inverter technology with advanced Waveform Control Technology™ to provide a better welding solution than traditional short arc MIG. Unlike CV MIG machines, the STT machine has no voltage control knob. STT uses current controls to adjust the heat independent of the wire feed speed. Changes in electrode extension do not affect heat, so low heat input welds can be produced without overheating or burning through, and distortion is minimized. Spatter and fumes are reduced because the electrode is not overheated — even when welding with larger diameter wires and 100% CO_2 shielding gas.

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

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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