

SUCCESS

**LINCOLN**<sup>®</sup>  
**ELECTRIC**  
THE WELDING EXPERTS

WAVEFORM CONTROL TECHNOLOGY™

# Surface Tension Transfer® (STT®)

STT on Sheetmetal

**CORSA Performance, Inc.**

**A manufacturer of high performance stainless steel marine and automotive exhaust systems uses Lincoln Electric's System 10 robotic welding system to dramatically improve production and weld quality.**

## - PROBLEM -

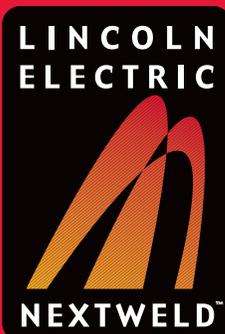
Reducing spatter and increasing production speed while maintaining high weld quality on thin gauge, stainless steel parts used in specialty exhaust systems for high-performance vehicles.

## - SOLUTION -

Lincoln Electric's pre-engineered System 10 robot welding cell with a Surface Tension Transfer (Invertec™ STT II) power source.

## - RESULTS -

Dramatic reduction in per-part welding time, the virtual reduction of spatter, and excellent weld quality.



**P**erformance vehicle owners love the roar of their engines while accelerating. But that same sound translates to a head-pounding drone and resonance during cruising speeds, making it hard to hear the radio or carry on a conversation.

CORSA Performance, Inc. of Berea, Ohio, developed its patented Power-Pulse RSC (Reflective Sound Cancellation) technology to deal with the issue. This unique muffler technology offers noise-suppression during cruising, and enhances the engine sounds during full-throttle acceleration.

## About CORSA Performance

CORSA Performance, which opened its doors in 1989, is an engineering and manufacturing company that specializes in high performance stainless steel marine and automotive exhaust systems. CORSA is the only marine/auto aftermarket manufacturer with in-house hydro forming capabilities. The company also has titanium welding and forming capabilities.

CORSA enjoys an 85% marine industry market share, supplying well-known boat manufacturers including Baja Marine™, Donzi™, Formula™, Cobalt™ and Crownline™. The company's Power-Pulse automotive mufflers have been utilized on a host of vehicles, including Corvettes™, Camaros™,

Firebirds™, Dodge™ Vipers™, Cadillacs™, Chevrolet™ and GMC™ Trucks and S.U.V.'s. CORSA's catalytic converter-back exhaust systems have also become a General Motors™ Service Parts Operations Licensed Product.



The first automotive muffler system developed by CORSA was intended for the fifth generation Corvette (C5). Before the system even went into production, it was selected for installation on the 1998 Indianapolis 500 Pace Car. Since that time, business has exploded, thanks to a growing enthusiasm for the Power-Pulse RSC Reflective Sound Cancellation exhaust system among car buffs.

## The Challenge

CORSA needed to find a way to increase production volumes and eliminate bottlenecks caused by the company's manual GTAW welding methods. While improving volume was a major impetus for considering robotics, weld

The future of welding is here.™

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quality was an equally significant factor in the firm's decision-making, according to Jim Browning, CORSA's owner and president. "When a CORSA system is pulled from the box, the first thing the customer notices is the welds," said Browning. "So while production speed was important to us, we also needed a system that would create consistently high-quality, spatter-free welds."

### The solution

CORSA's team researched a number of robotic welding systems. One was Lincoln Electric's System 10.

The System 10 is a pre-engineered, two-fixed table welding workstation, which is assembled and shipped ready to install. It utilizes a six-axis FANUC Arc Mate 50iL robotic arm with 3kg payload, and Fanuc R-J3 controller. Lincoln Electric recommended this system to CORSA because it is well-suited for applications with small parts. The unit features a complete metal surround flash and safety barrier and bi-fold safety doors with interlocks. An operator is able to load and unload one side of the cell while the robot welds simultaneously on the other side — facilitating excellent production rates.

**"The quality of the parts Lincoln produced was what finalized our decision to buy the System 10."**

"We took our parts to Lincoln and watched as they welded them on-site with the robot," said Paul Goth, Robot Programmer/Process Engineer at CORSA. "The quality of the parts Lincoln produced was what finalized our decision to buy the System 10."

Because of the thinness of the stainless steel used in the parts, Lincoln recommended the STT II power source to CORSA. Unlike standard CV MIG

machines, the STT has no voltage control knob. The STT uses current controls to adjust the amperage independent of the wire feed speed. This makes it much easier to make welds which require low heat input without melting through the base material. Also, distortion, spatter and smoke are minimized.

### The result

After CORSA's new System 10 robotic arc welding robotic system was installed

in September 2001, welding production improved from 44 to 180 Power-Pulse mufflers per day.

CORSA quickly realized that the arc welding robot could be utilized to grow business in other areas, and has since converted 12 of its manual welding stations to robotic stations.

### CORSA's Welding Operations

Parts that are welded robotically at CORSA



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Performance are chosen based on their volume and throughput in the shop. Each part design has its own set of fixturing and tooling which is built in-house in the company's tool room. "Your imagination is your only limitation," said Goth. "If a part is currently being MIG or TIG welded, I imagine the System 10 robot welding the part and then determine if the robot can do the job with the proper fixtures."

There are currently 12 parts welded by the System 10 at CORSA with many

plant from an outside vendor while the case is rolled and formed in-house. At the welding stage, the System 10 robot completes the welding by making two 28" fillet welds around the circumference of the part on each end cap. The C5's thin case is prone to melt through, yet needs to have a weld with good penetration. For the C5 application, CORSA uses a tri-mix gas (90% helium, 7.5% argon and 2.5% CO<sub>2</sub>) with .035" 316L wire.

Before automation, it took one GTAW welder 20 minutes to weld one C5 muffler. Today, the System 10 is able to produce the muffler in under two minutes. And since a single production worker can operate the robot, the company's skilled welders have been reassigned to other welding duties. Bottom line, the System 10 has increased per-day production volumes by 500%.

### Marine Silencer Tips

This part consists of a 16-gauge, 316L stainless steel formed case with a ring welded onto it. The tubing for this part is

cut to length and formed by CORSA, and the ring comes from an outside vendor. The welding for this part requires the robot to make four small stitch welds to hold the ring inside the tube and then one continuous 12" circular weave weld around the outer circumference of the part. For all the marine parts, CORSA uses a tri-mix gas (90% helium, 7.5% argon and 2.5% CO<sub>2</sub>) with .035" 316L wire.

The silencer tip had been welded manually using TIG, with a per-part welding time of three to five minutes. Today the arc welding robot has slashed that to 35 seconds per part.

After welding, all parts are polished to either a satin or a mirror-like finish. "The advantage of STT technology is that we don't have to deal with spatter, so we can go straight to polishing, saving us labor time," remarked Goth. "The robot gives us high quality MIG welds that look like TIG welds."

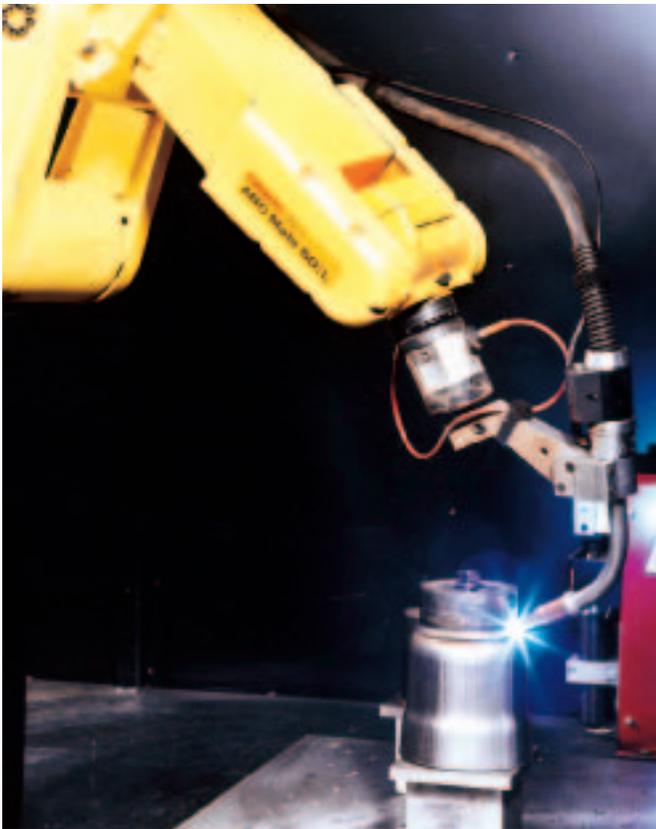
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**"We are still getting compliments on our welds from our customers."**

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According to Goth, STT and System 10 provide smooth, strong welds that have excellent fusion. "We feel that the weld quality we are getting now is even better than what we were getting with manual TIG methods. The welds are more uniform, much straighter and you don't see the starting and stopping points as you do with TIG welds," he said. "Since switching to the robot, we are still getting compliments on our welds from customers." CORSA Performance is also pleased with how easy it is to change welding parameters when setting up welding procedures. "I can change one setting, such as amperage, and not have to worry about affecting other parameters like wire feed speed," noted Goth. "The machine can even be programmed to do such unique things as a weave pattern. And, we have reduced scratches and other blemishes that resulted from too much part handling with manual welding methods."

By switching to robotics, we not only benefit from increased throughput in our system, but the cost of each part has gone down," said Browning. "Since installing the robot in our shop, we have reduced the backlog in our sales and



more planned for the near future. This Success Story focuses on two examples — the most popular components in each of the company's market segments.

### C5 Corvette and Camaro Muffler

The C5 and Camaro muffler is a long, 22-gauge, 304 stainless steel oval cylinder-shaped case with an 18-gauge end cap. The end cap is a stamping that comes into the CORSA Performance

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been able to meet customer demands. We couldn't be meeting our current production volume without it. It will pay for itself many times over."

## Programming and Service

One of the most important aspects of purchasing a welding robot, especially for a company that has never used robotics before, is the ability to program and troubleshoot the machine.

Goth has responsibility for developing welding programs for all the company's parts. "Lincoln did the initial programming for the C5 muffler, but since we've added more parts, I've been able to do all the programming in-house," he said. "I went to a three-day training seminar at Lincoln Electric where I learned the basics. I learned the rest by working with the robot and testing its capabilities. I continue to consult with several of our expert welders to help me achieve a weld that is strong and looks nice."

Once Goth installs a program, the operator has to simply push a few buttons on the robot's teach pendant to call up a specific program. This makes it easy to switch from one part to another.

Goth has also been pleased with the service Lincoln has provided. "When we run into a problem, I just call the company's hotline and Lincoln technicians have walked me through the solution," he said. "They won't hang up until my problem is solved."

## What's Next

In the future, CORSA Performance plans to continue adding robotics to its welding operations. "We are continually looking for ways to increase quality and reduce costs, and the robot has proven itself in both regards," said Browning.

## Featured Lincoln Product



### Inverter® STT II

The STT II combines high frequency inverter technology with advanced Waveform Control Technology in place of traditional short-arc GMAW welding. The STT II's precise control of the electrode current during the entire welding cycle significantly reduces fumes, spatter and grinding time. In addition, the unit offers independent control of wire feed speed and current.

## 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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