

SUCCESS

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THE WELDING EXPERTS

WAVEFORM CONTROL TECHNOLOGY™

Surface Tension Transfer® (STT®)

STT on Pipe

Sunland Construction, Inc.

Sunland Construction, Inc. of Eunice, Louisiana, faced steep challenges on the Gulfstream Project, a natural gas pipeline project that spans the Gulf of Mexico from Mississippi to Florida.

- PROBLEM -

Twice the thickness of a typical pipeline and demand for x-ray quality welds, combined with hazardous working conditions in the Florida wetlands, made efficiency and quality a major issue for Sunland.

- SOLUTION -

Lincoln's STT process was their best choice for the critical root pass, and fill and cap passes could be welded most efficiently using the Autoweld process, an automated, orbital pipe welding system that utilizes STT.

- RESULTS -

Introducing the STT process eliminated the need for an additional root pass and eliminated all grinding so Sunland could make code-quality welds in record time.



The installation of gas pipe through the designated wetland areas of Mississippi and Alabama could prove challenging for any contractor, but the thick-walled pipe specified on the Gulfstream Project presented new welding challenges for contractor

Sunland Construction Inc. Because the pipe is two times as thick as that which is typically used, Sunland relies on innovative welding techniques to decrease the number of weld passes necessary and most importantly, to assure the welds are consistent, x-ray quality. Sunland Construction Inc., headquartered in Eunice, Louisiana, turned to The Lincoln Electric Company's Autoweld® automatic orbital pipe welding system for the fill and cap passes and the STT® (Surface Tension Transfer®) process to lay the critical root pass. By implementing these new welding technologies, Sunland has been able to remove one electrode pass from the root pass process as well as eliminate all grinding from this step. With the Autoweld system, the company has reduced the overall time it takes to weld fill and cap passes.

"We have realized dramatic improvements since using the new Lincoln welding systems in both higher quality and time savings," said Joe Ratcliff, Project Manager for Sunland Construction Inc. "Our welders are proud of the new equipment, it has

made the welding portion of this job run smoothly."

Gulfstream Project

The Gulfstream Project is a natural gas pipeline that originates near



Pascagoula, Mississippi and crosses the Gulf of Mexico to Manatee County, Florida. Once onshore, the pipeline stretches across south and central Florida to Palm Beach County. This natural gas pipeline will serve Florida utilities and power generation facilities, generating 1.1 billion cubic feet per day of additional natural gas - enough to supply electricity for 4.5 million homes. Sunland Construction Inc.'s portion of the pipeline includes installation of 6.1 miles of 36" diameter pipe in Jackson County, Mississippi and 9 miles in Mobile County, Alabama.

A 27-year-old company with five divisions, Sunland won the Gulfstream job through a competitive bid process. More than 250 employees are being utilized on this project - taking a total of seven months to complete.

The future of welding is here.®

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2/4

STT on Pipe

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According to Ratcliff, preparing for pipe installation on this job is no small feat. "Before we can even begin to weld, we must first clear the land, prepare a right of way, install piling in some areas, erect construction bridges and bring in additional soil where needed. Because of the conditions of the wetland areas, all welding crews have to work on large, 4 ft. x 20-ft. timber mats. These mats, sometimes laid it down in several layers, provide a stable, dry work surface. Once work is complete in an area, Sunland Construction Inc. is also responsible for restoring the surrounding area to its original condition.

"Welding for this job is completed with three crews, one welding right after the other," noted Ratcliff. "The first crew installs the root pass, the second crew immediately follows using stick welding to accomplish a hot filler pass, and then the Autoweld crew completes the welding process with fill and cap passes."

Because of the extreme conditions on the site, the Autoweld process is performed inside of a welding "house" or modular unit that is lifted and moved every 40 ft. (from joint to joint) by a Caterpillar Challenger with a side boom.

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The Pipe

Pipe for the on-land portion of the Gulfstream Project is provided by Berg Steel Pipe Corporation of Panama City, Florida and its parent company, Europipe

GmbH of Germany. The X70 pipe ranges in wall thickness from 0.635 to 1.22. This thick-walled pipe was specified so the



pipeline could handle the pressure range of the Gulfstream system. Pipe is coated with a Fusion Bond Epoxy (FBE) on both the interior and exterior, and a majority of the pipe is also concrete coated for buoyancy control.

Root Pass

Sunland Construction Inc. utilized the STT process because of the advantages it offered.

STT is a modified MIG process that uses high frequency inverter technology with advanced Waveform Control to produce high quality welds while also significantly reducing spatter and smoke. STT technology has the ability to control heat input independently of wire feed speed - this allows the welder more control over the puddle and provides the ability to adjust the heat input to achieve the desired root bead profile. The welder simply positions the arc on the forward portion of the weld puddle and follows it around the pipe in a vertical down fashion.

With the system, Sunland welders can achieve a uniform gap by using an internal, pneumatic clamp to line up and space the pipe for accurate welding.

For the Gulfstream Project in particular, STT is able to produce a quality weld and allows an increased amount of weld metal to be placed on the heavy wall pipe for improved resistance to cracking.

With STT, Sunland only has to make one pass for the root bead as compared to two passes plus grinding time with stick.

"Since the root pass is the foundation for the rest of the weld, achieving a high quality, strong and uniform weld is very important to us," said Ratcliff. "We are very pleased with the STT. It has allowed us to save time and is an easy system for our welders to learn. The STT process is very forgiving, meaning that it helps compensate for misalignments, if and when necessary."

The two STT machines on the Gulfstream job site are used in conjunction with Lincoln's .045 L-56 SuperArc wire and 100 percent CO₂ shielding gas. As compared to blended gases, CO₂ is able to provide better penetration and is less expensive. "The STT is able to apply a root bead with great consistency over a wide variety of joint conditions" explained Ratcliff.

Hot Filler Pass

Once the root pass is complete, the next team of welders follows closely behind to weld in the hot filler pass. Due to the thickness of the pipe on this job, Sunland Construction Inc. elected to put a single downhill hot filler pass over the root with a downhill, low hydrogen stick process. "The added filler metal we deposited at this stage gives us additional backing to lay the first wire filler and means that we don't have to make quite as many passes with the Autoweld system," noted Ratcliff.

To do this interim step, Sunland is using Lincoln's LH-D 80 rod with a conventional 300-amp Lincoln belt-driven welder.

Fill and Cap

For the Gulfstream Project, Sunland Construction Inc. decided to invest in an automated process to weld the fill and cap passes. Previously, Sunland has been completing the fill and cap passes with a 70+ stick electrode, welded vertical down and requiring numerous passes.

"We wanted an automatic method to

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3/4

STT on Pipe

Sunland Construction, Inc.

increase efficiencies and decrease overall costs," said Ratcliff. "It was also important for us to find a system that



could provide a quality product but yet was easy to operate.

In its quest, the company contacted a number of manufacturers to research which system would work best in this application. "We narrowed down our choices and visited a couple of manufacturers to try out their systems, one of those being Lincoln Electric," noted Ratcliff. "Our team traveled to Lincoln's Cleveland headquarters where we had the opportunity to run our procedures on an actual Autoweld set-up. After we returned, we listed the pros and cons of every system and Lincoln's Autoweld came out on top. A big factor in our decision was the amount of technical support that Lincoln could provide to us."

The Autoweld system is enclosed in a house, so that welding can be done out of the elements. These houses are moved by sidebooms (Challengers) from one length of pipe to the next. Sunland uses six Caterpillar Challengers with PTO driven generators to produce the 100 amps at 460 volts needed to operate the Autoweld and accessories. Lincoln's Autoweld system uses a specially designed lightweight-welding head to travel around the circumference of the pipe. In addition, the unit utilizes an external crawler band placed on the pipe to one side of the field joint weld bevel. Two machines operating simultaneously complete the vertical up welding - one machine starts at the bottom with the other starts on the side.

Once the machine that started on the side reaches the top, it then is positioned to start at the bottom to complete its side of the pipe. Using the vertical up process is a break from the traditional, vertical down welding typically utilized for pipe.

Each wall thickness of pipe requires different machine settings for each specific pass. These settings are charted and can easily be set from the machine. The Autoweld system uses a flux core .052" wire and a shielding gas of 25% CO₂/75% argon.

With Autoweld, Sunland Construction Inc. is achieving repetitiously consistent, x-ray quality welds. "Autoweld makes a very consistent, uniform, and precision-controlled metal deposit," noted Ratcliff.

"The weld has high tensile strength and good Charpy values in the weld and pipe heat zones. The machine is also very durable and dependable."

Sunland's Autoweld system is powered by an Invertec® V350-PRO, an extremely lightweight inverter that is able to handle multi-process applications. The hallmark of this power source is an extremely smooth arc due to the unit's advanced inverter technology.

"We feel the V-350 is the state of art in welding equipment, it gives you the ability to maintain precise settings and arc performance," claimed Ratcliff. "Even after long hours of use on our construction site, the machine was dependable."

Quality Control

All welds once completed are visually inspected and then x-rayed with an internal crawler. All welds must meet API 1104 Section 9 requirements.

Service

Sunland Construction Inc. has been extremely pleased with the service it receives from Lincoln. "The on site support provided by the Lincoln Electric Mobile team of Troy Gurkin and Steven Brown has been superb," said Ratcliff. "We also enjoyed tremendous support from the Cleveland based Autoweld group including Eric Stewart, Autoweld technician, who was on site for much of the project. Lincoln has gone out of its way to help us implement our new processes and suggest new technologies when appropriate."

Sunland has also taken advantage of Lincoln's training programs on-site and in Cleveland. "Lincoln was challenged with taking welders at all different levels of expertise and work with them to learn to understand and operate the Autoweld system. It was a massive training effort that required quite a bit of Lincoln's time. We appreciate all they have done to make this job run smoothly."

Future

Sunland Construction Inc. is already planning on how the new STT and Autoweld machines can be used on future jobs to increase efficiencies.

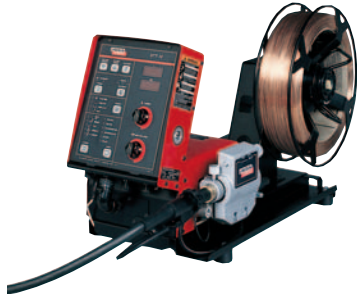
Surface Tension Transfer® (STT®)

4/4

STT on Pipe

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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% CO₂ shielding gas.



Super Arc L-56 MIG wire

Lincoln's premium copper coated MIG wire, SuperArc L-56 is an excellent choice for welding on metals with a medium to high presence of millscale. For best performance use on clean, oil-free, and rust-free base material. Best weld appearance and toe wetting when compared to ER70S-3 and ER70S-4 classifications.

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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