

SUCCESS

LINCOLN[®]
ELECTRIC
THE WELDING EXPERTS

Surface Tension Transfer[®] (STT[®])

STT on Pipe

Lockerbie & Hole, Inc.

The Power Wave 455/STT cut welding time by 75% on some welding operations.

- PROBLEM -

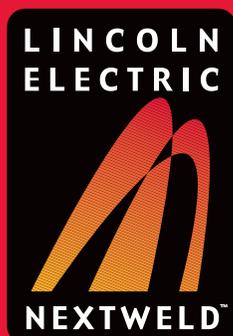
TIG welding was too slow to keep up with the production goal of 15,000 inches of pipe spooling every week. Necessary MIG welding also required a second welding power source for every operator.

- SOLUTION -

The Lincoln Power Wave 455/STT was tested and selected over competitive models for its multi-process capability, superior arc control and high productivity on mild steel, stainless and chrome piping.

- RESULTS -

- STT cut root pass welding time on stainless pipe by 75%.
- Costs were reduced with lower-cost larger-diameter wire without sacrificing quality.
- Training was minimized — operators were pleased with the arc action.
- Unprecedented Arc Control — Lincoln's Waveform Control Technology™ delivered a customized arc for every application.



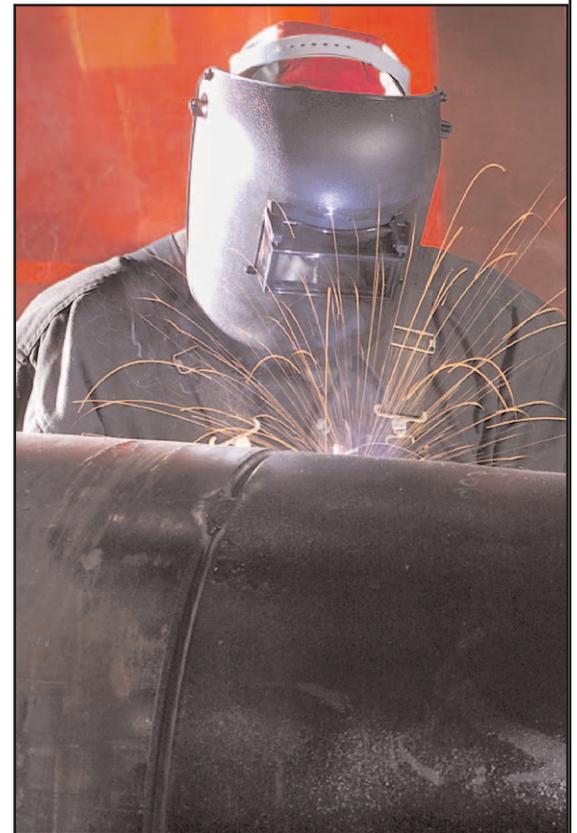
To say the people at Lockerbie & Hole Inc. know a thing or two about quality would be an understatement. After 105 years in the construction and fabrication industry, maintaining a sterling reputation throughout, the company's commitment to quality should serve as a role model.

Randy Gleave, Lockerbie & Hole's welding foreman, sums it up, "If the quality is not there, the customer never forgets and the opportunity for jobs gets smaller. Our goal is to do it right the first time. If the quality is there, the jobs will come."

And the jobs have come. To name just a few of Lockerbie & Hole's more

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recognizable clients, Syncrude Canada, Suncor Energy, Shell Canada, Union Carbide, Scott Paper, Weyerhaeuser Canada Ltd., General Foods, the Labatt and Molson breweries, and the



Canadian divisions of the Ford Motor Company, Toyota Motor Manufacturing, Honda, General Motors, Chrysler and Hyundai, have all benefited from Lockerbie & Hole's quality workmanship. Additionally, over the past decade, Lockerbie & Hole has executed approximately \$85 million in environmental infrastructure projects in China.

Headquartered in Edmonton, Alberta, Canada, with 10 branch offices across the country and five fabrication facilities, Lockerbie & Hole is unique in the Canadian construction industry because of the number of services it offers its

The future of welding is here.®

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clients in the industrial, commercial, municipal, and institutional market sectors. These services include the fabrication of pipe spools, modules, boiler tubing, tanks, vessels, plate work, and miscellaneous steel.

Field construction services include civil, mechanical, electrical, instrumentation, electrical testing, structural, boiler erection, maintenance/shutdowns, insulation, fireproofing and asbestos abatement. The company is also fully integrated and does not require the use of many subcontractors, thereby reducing the overall total installed cost to its clients. In all, Lockerbie & Hole employs 360 salaried and 2,650 seasonal employees.

As with any construction or fabrication company, Lockerbie & Hole relies heavily on welders. And who does Lockerbie & Hole turn to when it's looking for advanced technology and dependable, quality equipment when it comes to its welders? The Lincoln Electric Company.

Much of Lockerbie & Hole's business is in pipe fabrication for the oil, gas and petrochemical industries. The company fabricates pipe from 1-inch up to eight-foot in diameter. The goal is to produce 15,000 inches of pipe spooling per week out of our Strathcona facility, none of which is ever the same. To that end, Lockerbie & Hole utilizes nearly 120 highly-skilled tradespeople, including 40 welding operators working 40-hour work weeks. Reliable welding equipment is also necessary to produce pipe that is up to the standards of The American Society of Mechanical Engineers (ASME) and the Canadian Welding Bureau (CWB).

Lockerbie & Hole recently purchased



42 of Lincoln's Power Wave® 455/STT® units for welding its carbon, stainless steel and chrome piping. True to its reputation for quality assurance, Lockerbie & Hole tested the Power Wave 455/STT, under the direction of Gleave and Operations Manager Laury Yakemchuk, against all the makes and models of multi-process welders that fell into the same category.

Originally purchasing five Power Wave 455/STTs to test on a specific stainless steel pipe project, Gleave said that if they wouldn't have purchased those original five machines, they wouldn't have been able to complete the job on time — the Power Wave 455/STTs permitted operators to weld twice as fast compared with the previously used machine. Gleave said the Power Wave 455/STT tested on top because:

- It was capable of all the processes required — stick, TIG, MIG and flux-cored.
- The machine is fully programmable.
- Lincoln's commitment to customer application engineering, testing and

developing of new, updated or modified welding waveforms allowed Lockerbie & Hole to zero in on the right customized arc characteristics for its own applications.

“If we had been using TIG, which is what we have done in the past, the project would probably have taken another two to three months.”

- The STT allowed Lockerbie & Hole to weld root passes on stainless steel pipe in about one-quarter of the time that it would normally take using the TIG welding process.

The Power Wave 455/STT is an inverter-based welding system that uses Lincoln's Nextweld® advanced Waveform Control Technology™ to control the electrode current during the entire welding cycle. The result is precise control of the waveform output for reduced arc spatter,

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reduced fumes, and exceptionally smooth welding performance.

“If we had been using TIG, which is what we have done in the past, the project would probably have taken another two to three months,” Gleave says.

The STT, or Surface Tension Transfer process, operates in neither constant voltage (CV) nor constant current (CC) mode. It operates in a mode where electrode current is based on the instantaneous heat requirements of the arc. STT is suited for a broad range of materials including solid steel and stainless alloys, high nickel alloys and silicon bronze.

Previously, the shop was using the MIG (GMAW) process on root beads with an .035" diameter electrode. By utilizing the STT process, Lockerbie & Hole was able to maintain quality, productivity and more than adequate penetration with a larger .045" diameter wire. By nature, most larger diameter wires can be purchased at a lower price, so the result was a welding consumables cost savings.

Gleave says that the STT process,

combined with the capability to download software into the machine to change wave forms to adapt to welding different materials, is a huge benefit in the shop. The operators have also been impressed with the smooth operating characteristics of Lincoln's Outershield® 70 gas-shielded flux-cored wire electrode (FCAW-G) and are pleased with the ease of handling of Lincoln's 71 Elite gas-shielded flux-cored wire electrode for out-of-position welding.

Lockerbie & Hole also purchased 24 Invertec® V350-PRO models based on their compact size and portability, multi-process capabilities, power efficiency, process versatility, and programmability similar to the Power Wave 455/STT.

The V350-PRO is the most powerful inverter in its class and provides 350 amps at 60 percent duty cycle. Operating on single or three-phase input power, the unit produces either a constant current or constant voltage welding output for stick, TIG, or MIG.

TRANSITION

Each welding operator in the pipe fabrication shop had been primarily using two machines — one machine for stick and TIG welding, and a Lincoln CV-300 for putting in MIG roots. A Lincoln DC-600 was also available for stick, flux-cored and submerged arc welding. The Power Wave 455/STTs replaced all these machines.

Gleave said that when they brought in the new machines, the operators were a little hesitant to embrace the new technology. However, once the staff started using them, they were surprised at how easy the units are to

“At first, a lot of the welders were skeptical, because they would watch the puddle and thought it was not penetrating through the land to the inside of the pipe on a butt weld.”

operate. The Power Feed® 10 wire feeders were a hit because of the push button feature that allows the operator to control four different programs per side of the feeder. The additional control of the Power Wave/Power Feed system gives operators the ability to set range limits and fill craters.

Switching over to the STT (Surface Tension Transfer®) process was not a problem for most of the welders, Gleave says. Operators who had traditionally used MIG picked it up in minutes.

Surface Tension Transfer welding is a GMAW, controlled short circuit transfer process developed and patented by The Lincoln Electric Company. Unlike standard CV GMAW machines, the STT machine has no voltage control knob. STT uses current controls to adjust the heat independent of wire feed speed, so changes in electrode extension do not affect heat. The STT process makes welds that require low heat input much easier without overheating or burning through, and distortion is minimized. Spatter and fumes are reduced because the electrode is not overheated — even



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QUALITY

Overall, Gleave says the STT process has improved welds over the TIG process with ease of operation, particularly at the starts and stops. Having utilized the new Lincoln equipment for one year, Gleave says he cannot recall having a root-related repair on a pipe that was

welded with the Power Wave 455/STT utilizing the STT process. He has also witnessed a reduction in spatter and welding fume.

with larger diameter wires and 100% CO₂ shielding gas. This gas and wire combination lowers consumable costs.

“At first, a lot of the welders were skeptical because they would watch the puddle and thought it was not penetrating through the land to the inside of the pipe on a butt weld,” Gleave says. “After looking inside the pipe, they could not believe it had penetrated through and how much better it was fused into the parent material when compared to regular short circuit MIG.”

Gleave says his operators are also impressed with the user-friendly aspects of the Power Wave 455/STT. In just one example, an operator was experiencing some problems with his welds and Gleave told him that he'd download some new software, load it into his machine and the problem should be fixed.

“Two days later when I came back with a laptop and said to him, ‘Try this,’ he just shook his head and said, ‘Wow. I thought you were joking,’” Gleave says. “It used to be if you had a minor adjustment issue, you just dealt with it because that’s how the machine ran.”

Along with the quality comes service which Gleave has also been impressed with. “The support between Lincoln and B.O.C. (Lockerbie & Hole’s distributor) has been great,” Gleave says. “Whether questions have to do with consumables or the equipment in general, both parties have backed us with the technical support. Then we find a solution and move on.”

And getting the job done right the first time and moving on is how business gets done.

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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