

United Spiral Pipe LLC

Success Story

New Tack-Welding Integration Pays Off for Oil & Gas Pipe Maker



Adding the Power Wave® AC/DC 1000® SD from Lincoln Electric allows United Spiral Pipe to nearly double line speed, while boosting quality.

Each day, fabrication crews at United Spiral Pipe LLC are charged with one task: to produce high-quality, large-diameter, helical-submerged-arc-welded (SAWH) spiral pipe for the oil and gas industry. And they do just that – at record-breaking speeds.

The Pittsburg, Calif.-based pipe mill, a joint-venture between U.S. Steel, SeAH and POSCO, uses an advanced automated two-step welding process that is capable of producing 300,000 net tons of line pipe per year. Outside diameters of produced spiral pipe range from 24 to 64 inches, using A252- through X80-grade steel with wall thicknesses from ¼ to 1 inch. The process consists of one forming and three welding lines.

Two-Stepping through Production

Two-step spiral SAWH-pipe fabrication begins with forming, tack welding and cutting. Hot-band coils unwind on a mandrel and feed into an edge miller that cuts and prepares strip edges for the tack welding process. The feed angle depends on strip width and final outside diameter. From there, the pipe is formed into the proper diameter and tack welded via a large-wire gas-metal-arc-welding (GMAW) process and cut in lengths from 40 to 80 feet.

The second step of the welding process sends the tack-welded pipe into one of three final welding stations. Here, the pipe's tack-welded seam is re-welded using SAWH to fully meet API 5L standards and customer requirements.

Welding Speed Nearly Doubled

Upfront during initial tack welding is where the mill has gained true speed and efficiency – with measurable quality improvements. Welding speeds have nearly doubled at the tacking station via a unique setup using the Power Wave® AC/DC 1000® SD power source from Lincoln Electric and integration through Uhrhan & Schwill GmbH, a Lincoln Electric subsidiary.

“Thanks to this technology and our unique production process, we believe we are running at least 33 percent faster than any other pipe mill in the world,” says Charlie Lamb, United Spiral Pipe’s vice president of operations.

“If it ain’t broke, don’t fix it” is a pearl of wisdom that apparently has no traction at United Spiral Pipe. Until a year and a half ago, according to Lamb, the company’s production was right on par with pipe mills around the world – including a handful in the United States – that manufacture line pipe in a similar fashion.

“Inherently, there was no problem with our old tack-weld system using traditional DC-1000 Lincoln Electric power sources that provided large amounts of current to a single GMAW arc,” Lamb explains, “which is the industry standard.” Lamb should know. Prior to joining United Spiral Pipe he had been in the industry for three decades.



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“...United Spiral Pipe raised the bar for spiral tacking speeds.”

Uhrhan & Schwill GmbH, committed to providing unique and custom solutions to customers for 50 years, did just that at United Spiral Pipe.

“Tack welding is a common bottleneck in both longitudinal and spiral pipe mill production all over the world,” explains Elmar



Schwill, chief engineer at Uhrhan & Schwill GmbH. “Working with United Spiral Pipe raised the bar for spiral tacking speeds.”

Mark McDowell, Lincoln Electric's district manager for Northern California and Nevada, has been involved with United Spiral Pipe since the beginning, and continued the partnership with this process innovation.



“From day one, our (Lincoln Electric) team has worked closely with United Spiral Pipe focusing on continual improvement,” he says. “United Spiral Pipe relies on Lincoln Electric to continually bring cutting-edge welding solutions.”

David Kilburn, global segment director for the pipe-mill industry with Lincoln Electric, agreed, noting that “our relationship with United Spiral Pipe has helped push boundaries in many areas of spiral pipe welding.”

So exactly what is that new setup?

Uhrhan & Schwill GmbH integrated a paralleled master-slave configuration of the Power Wave® AC/DC 1000® SD utilizing Waveform Control Technology®. Lamb explains that United Spiral Pipe “solely uses various diameters of Lincolnweld® L-61 wire, depending on the thickness of the parent material, with a shielding gas mixture of 90/10 CO₂/Ar. This, combined with the Power Wave® power sources, creates a consistent tack weld with minimal spatter.”

Utilizing Lincoln Electric's Waveform Control Technology®, with a specific waveform controlling a number of arc parameters for this application, creates a more consistent tack weld that helps increase welding speeds at the SAWH stations.

Quality Up, Too

The introduction of the Power Wave® AC/DC 1000® SD system via Uhrhan & Schwill's GmbH integration also brings significant quality improvements. Weld quality is confirmed through United Spiral Pipe's extensive testing processes. Once the spiral pipe leaves the fabrication cycle, it first undergoes hydrostatic testing to an internal pressure of 100 percent of the pipe's specified minimum yield strength for a minimum of 20 seconds. Next, the entire weld seam is tested using shear wave off-line ultrasonic transducers arranged to pick up longitudinal and transverse defects. Following ultrasonic testing, x-ray testing is performed before the pipe heads to United Spiral Pipe's coating operations.

On Top of the Pipe-Production World

With production and quality increased, United Spiral Pipe finds itself on top of the world in production speeds for large-diameter pipe for oil and gas. Its willingness to see an opportunity in a situation where it would have been easier to accept the status quo has reaped huge rewards, and positions the company for continued success.

“Any time we are getting increased tonnage out the door, as we are now, means that our bottom-line costs are reduced,” concludes Lamb. “United Spiral Pipe had great vision to try this new tack-welding technology.” ■



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