



## ESAB Solves Deck Welding Distortion and Quality Issues For One-Sided SAW Application with Tandem ICE™ Process

- ESAB boosts productivity dramatically at Louisiana shipyard.
- Mechanical properties “off the charts on the good side.”
- Robust parameters developed for welding plate 1/4- to 1-in. thick.

### Situation

A Louisiana shipyard uses a large gantry and the submerged arc welding (SAW) process to weld deck plate from 3/8-in. thick in a square butt joint configuration. A magnetic hold down bed secures the plates with a consistent gap, and a copper backing bar enables one-sided welding.

### Complication

The vice president of operations contacted ESAB’s welding automation sales director because the yard was struggling with the reliability of a competitor’s tandem arc system with a DC 1500A lead and an AC 1200A trail, both with 5/32-in. diameter wires. The call was further prompted because the yard faced several other productivity issues, including distortion that required straightening to correct, rework to repair weld defects and the need to manually weld the last few feet of the plate because otherwise excess heat input caused weld cracking.

### Solution

The ESAB automation team solved the customer’s immediate technical issues, getting the competitor’s unsupported system running. As a result of these efforts, the team earned a PO for an ESAB tandem ICE™ (Integrated Cold Electrode) system that enabled the shipyard to completely weld the entire 40-ft. seam. ICE Technology reduced distortion and rework by 75% and delivered weld quality that exceeded all expectations.



## BENEFIT #1

### No Distortion with ICE™

The tandem ICE system ESAB developed for the shipyard features a DC leading arc, a LAF 1601 power source and an A6 welding head. The AC trailing arc features a TAF 1251 power source and the ICE torch that feeds an electrically “cold” third electrode into the molten weld pool to increase metal deposition without increasing heat input. Further, the feed rate of the cold electrode can be adjusted independently to tailor the deposition rate and bead profile for a particular application.

The ICE process enabled the shipyard to increase travel speeds and lower heat input (kilojoules per meter), almost eliminating issues related to distortion. The yard can weld the entire 40-ft. joint in one pass without stopping or finishing the joint with manual welding. After passing X-ray tests, the deck plate moves to the stiffer welding stations without delay. The with previous process, the plate could curl like a potato chip unless weight were added, and rework was often required due to welds stressed by distortion.

## BENEFIT #2

### Superior Weld Quality

Controlling heat input doesn't just prevent distortion; it also improves mechanical properties. The shipyard achieved results that “were off the charts on the good side” for tensile, yield and impact strength using ESAB's Spoolarc 81 solid wire and OK 10.62 flux.

OK 10.62, a Mil-Spec-grade flux, contributes significantly to the superior mechanical properties. Introduced in 2017, this high basicity, neutral, agglomerated flux is especially suited for narrow gap welding because of its good slag detachability and smooth sidewall blending. The narrow running slag allows higher currents in narrow gap joints, which means increased deposition rate and consequently higher productivity.



Notice the perfect reinforcement level on top side of the bead **L** and excellent the back side bead **R** profile.

## BENEFIT #3

### Process Adaptability & Reliability

Following the success on 3/8-in. plate, the shipyard invited ESAB to develop parameters for one-sided tandem ICE welding for additional thicknesses, including 1/2, 5/8, 7/16, 3/4 and 1 in. — all completed in a single pass. Every joint has a square butt configuration except the 1 in., which requires joint preparation.

After two years of experience with the system, coupled with significant on-site application engineering support, the shipyard has become very adept at tuning parameters. Further, the ESAB SAW system has functioned with 100% mechanical reliability.

## BENEFIT #4

### Expanded Relationship

Because of the excellent service and technical support provided for the SAW system, ESAB's relationship with the shipyard has expanded. It now includes manual plasma systems, standard welding equipment and cutting automation.



The integrated ESAB cutting automation solution improves weld quality throughout the yard by providing more consistent edge preparation.

Contact your ESAB sales representative to learn more, or visit [esab.com/shipbuilding](http://esab.com/shipbuilding)



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