

# Stinger Welding Inc.

Success Story

## Fabricator Beats Critical Bridge Reconstruction Deadline with New Welding Equipment



### »» CHALLENGE

Two demanding California bridge jobs required delivery of parts in a matter of days with welds meeting strict mechanical property requirements for impact and fatigue.

- 12 plate girders in eight days to repair two spans of highway overpass.
- 1,735 inches of 8" - 24" diameter pipe certified to API 5L line pipe and PSL-2 grades X52 and X60.



Stinger girders were installed only eight days after the MacArthur Maze overpass accident.

### »» SOLUTIONS

- Lincoln Electric Idealarc® DC-1000
- Lincoln Electric LT-7 Tractors and NA-3 Automatic Wire Feeders
- Lincoln Electric Lincolnweld® LA-75 and 888™ Submerged Arc Wire and Flux
- VERNON Tool™ Thermal Cutting Equipment

### »» RESULTS

- 50% increase in productivity for girder construction.
- 100% inspection pass rate with no on-site work required.
- Impact toughness significantly exceeded contractual requirements.
- Multi-purpose submerged arc consumables could be used for multiple jobs with no changeover time.

In 2007, a gasoline tanker overturned on California Interstate 880, caught fire and destroyed two spans of the overpass bridge on Interstate 580 near Oakland, Calif. The California Department of Transportation (CalTrans) immediately put the bridge reconstruction project out to bid for this span of highway – known locally as the MacArthur Maze – that sees in excess of 150,000 vehicles a day. Bridge fabricator Stinger Welding Inc. won the subcontract for 12 plate girders, which would allow for emergency repairs to be made.

“The tanker accident had immediate and far-reaching effects on the local economy – traffic had to be rerouted, other construction projects were delayed, and public transportation was terribly overloaded,” explains Gary Gardner, quality assurance/quality control manager and CWI for Stinger Welding. “CalTrans initially estimated it would take at least six months to complete the reconstruction. Due in large part to our turnaround time on the girders, it was done in three.”

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For the MacArthur Maze project, the company's experience in constructing fracture-critical bridge structures (projects that necessitate special certification due to the load-bearing configurations) helped it win the bid. But its delivery of completed plate girders in record time reinforced its reputation for doing great work fast.

"Running only two shifts, we fabricated 12 plate girders in eight days, allowing the I-580 bridge spans to be reopened in just three months – six weeks ahead of best estimates," Gardner says. "CalTrans had six full-time inspectors on site inspecting and non-destructively testing 10 percent of the welds, and they almost couldn't keep up with us."

### Stringent Manufacturing and Material Requirements

The 100-employee company fabricates bridges as well as bridge components in strict accordance with American Welding Society's (AWS) D1.1 through D1.6 requirements – which cover specifications for structural steel, aluminum, sheet steel, reinforcing steel, fracture-critical bridges, and structural stainless steel. These standards are required due to the heavy use, weight requirements, and materials that reliable bridge components necessitate.

Additionally, the company works almost exclusively with local and state departments of transportation, which typically require U.S. manufactured materials.

Meeting both AWS and CalTrans stringent standards, the plate girders – or structural supports – for the MacArthur Maze projects were 42" tall with the longest one measuring 90' and the shortest about 60'. They are constructed from A709 Grade 50, a high-strength, low-alloy structural steel.

The majority of each plate girder manufactured on site at Stinger's plant in Coolidge, Ariz., used the submerged arc welding process. The AISC-certified fabricator chose Lincoln Electric's Idealarc® DC-1000 power sources, LT-7 tractor wire feeders, NA-3 wire feeders, with Lincolnweld® LA-75 wire and 888™ flux to get the job done to the highest standards.

The Idealarc® DC-1000 power sources are used in partnership with three Lincoln Electric LT-7 tractors and two NA-3 feeders on manipulators to enable fabrication of these girders through the submerged arc welding process.

Stinger found the combination of Lincolnweld® LA-75 wire and 888™ flux – along with the DC-1000 with LT-7 and NA-3 –

provided a number of advantages throughout the manufacturing process. First, it satisfied the need for low hydrogen, high strength wire and flux – which is necessary for reliably welding the bridge's AASHTO M270/ASTM A709 grade 50 steel in accordance with the AWS D1.5 code.

**"Stinger is 100% prepared to deliver welded structural materials that are safe for use in locations with Zones 1, 2, and 3 climatic conditions."**

"The welds resulting from this combination consistently meet mechanical property requirements and provide extremely good low temperature impact strength," Gardner reveals. "With no changes to consumables and with no additional specialized testing, Stinger is 100% prepared to deliver welded structural materials that are safe for use in locations with Zones 1, 2, and 3 climatic conditions," (anywhere from the equator to the Arctic Circle).

This Lincolnweld® wire electrode and flux combination is multi-purpose, and Stinger is able to use the same consumable pairing for all its submerged arc applications. This translates into time and cost savings as fewer procedure qualification records (PQRs) and welding procedure specifications (WPSs) are necessary.

Lincoln Electric's Idealarc® DC-1000 with LT-7 and NA-3 feeders allow for rapid reconfiguration for different welding processes, including FCAW, GMAW (MIG), GTAW (TIG), SMAW (stick) and submerged arc which decreases the amount of time Stinger spends on periodic calibration per AWS requirements.

"The Lincoln Electric equipment gives us outstanding repeatability, which is critical with the type and number of projects running through our shop. Plus, they are easy to calibrate and require minimal maintenance," Gardner says. "These factors save us time and money – making us more competitive in a government bid system that typically awards projects to the lowest bidder."

In addition to its fast turnaround, Stinger's attention to detail translated into each of its 12 girders on the MacArthur Maze passing inspection without any required on-site rework.



Stinger Welding fabricator uses Lincoln's LT-7 wire feeder tractor for maximum mobility when subarc welding 12 bridge girders.

### Stinger Tackles another Challenging Bridge Project

Imagine a bridge that needs to bear the combined weight of six rail cars, each of which has a gross weight of 175,000 lbs. The Tempe Town Lake Bridge, a Valley Metro commuter light-rail line connecting Phoenix, Tempe, and Mesa, Ariz., needed to bear this combined potential weight, which equals upwards of one million pounds. Now imagine this loading in a cyclic application.

“The Tempe Town Lake Bridge needed to simultaneously carry the weight of two passing trains – each with three cars per train for a total of six – anticipated to pass over the bridge as often as every five minutes during peak commuting periods,” Gardner explains. “For this project, the bridge had to withstand both significant cyclic and fatigue stresses.”

Stinger used 8”, 10”, 18” and 24” diameter pipe certified to API 5L line pipe and PSL-2 grades X52 and X60 for the light-rail project bridge, which measures 1,735’ in length in each direction. The company turned to Lincoln again and utilized the successful combination of Lincolnweld® LA-75 wire and 888™ flux with Lincoln’s Idealarc® DC-1000 power sources and NA-3 wire feeders.

**By using VERNON Tool’s thermal cutting equipment, Stinger made the enormous task of cutting and preparing each beveled end both feasible and economical.**

The bridge required over 2,000 complete joint penetration (CJP) welds to comply with AWS D1.1 standards—1,320 of which required specialized open-root T-K-Y pipe connections. To further complicate matters, the structure required the connection of 722 completely unique component pieces in K connections. Luckily, by using VERNON Tool’s (a recent acquisition of Lincoln Electric) thermal cutting equipment Stinger made the enormous task of cutting and preparing each beveled end both feasible and economical. The open-root CJP welds were performed and had a 100 percent pass rate with minimal rework after ultrasonic testing—to Class X criteria.

**“Lincoln’s equipment and consumables consistently provide outstanding results for us on all types of projects. It’s why we’re a red shop.”**

“The impact testing we performed on the qualification welds for this project, as well as those for the MacArthur Maze, resulted in Charpy V-Notch values which significantly exceeded contractual requirements,” Gardner proudly states. “The consistently excellent results using these Lincoln consumables and equipment allow me to sleep at night.”



Lincoln’s Idealarc® DC-1000 power source and NA-3 wire feeder helped Stinger achieve the highest productivity.

In addition to the MacArthur Maze and Tempe Town Lake Bridge projects, Stinger has completed high-profile rail projects for Union Pacific Railroad in Gilbert, Ariz., (the state’s first application of ASTM A709 HPS Grade 70W high-performance steel) and Queen Creek, Ariz., as well as vehicular, pedestrian, and utility bridges throughout the western United States.

“Lincoln’s equipment and consumables consistently provide outstanding results for us on all types of projects. It’s why we’re a red shop,” Gardner adds. “Plus, Lincoln equipment and wire are manufactured right here in the United States — just another reason why we’re proud to use it.”

Stinger Welding Inc. is an AISC-certified Major Bridge fabricator with a fracture critical endorsement. Stinger is located in Coolidge, AZ, between Phoenix and Tucson. Examples of their work can be viewed on their website: [www.deckjoint.com](http://www.deckjoint.com). ■

## »» FEATURED LINCOLN PRODUCT

### Idealarc® DC-1000

If your application requires pure welding power combined with multiprocess flexibility, then the DC-1000, with 1300 amps of smooth DC output, is your best investment. Designed for semiautomatic and automatic welding, the precise control of the DC-1000 delivers superior high amperage MIG, flux-cored, submerged arc welding and air carbon arc gouging with up to 5/8" (15.9 mm) diameter carbons.



### LT-7 Tractor Wire Feeder

The LT-7 Tractor is a self-propelled mechanized wire feeder, designed for the submerged arc process with track system capabilities. It is self-guiding and easy to operate – only one operator is usually required. It is designed to be used with a variety of Lincoln DC constant voltage and constant current power sources.



### NA-3 Automatic Wire Feeders

- Solid State Controls
- High Productivity
- Low Cost Repetitive Welds
- Operating Versatility
- Easy Installation
- Worry-Free Operation



NA-3 Control Box (K210-2)

### Lincolnweld® LA-75 and 888™ Submerged Arc Wire and Flux

Lincolnweld® 888™ is a basic flux designed for joining mild steel and low alloy steels and is capable of producing Charpy V-Notch test results of 90 ft•lbs (122 J) at -80° F (-62° C) when paired with Lincolnweld® LA-75.



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