

20% Increase In Welding Productivity

Vantage® 400

Veit Companies of Rogers, MN



From its headquarters in Rogers, MN, and operations in Duluth and Rochester, MN, Veit Companies have provided specialty contracting services since 1928. This side of the business includes earthwork, demolition, utilities, foundations, industrial clearing and environmental remediation. The firm is also in the waste management business and provides roll-off containers, recycling and landfill services.

- CHALLENGE -

- Weld 2,400 12-by-12 inch dimensional H-beams in less than 11 weeks on the muddy banks of the Mississippi River.
- Hold up to the rigorous 12-hour days of heavy-section continuous welding operation.
- Weld and have auxiliary power for other tasks, such as grinding.

- SOLUTION -

Vantage® 400 engine-driven, diesel-powered welder/generators

- RESULTS -

- 20% increase in welding productivity.
- Over the 11 week period, 50,000 linear feet of stick weld metal (SMAW) were laid under very tough conditions.



Constructing a Massive Power Plant Foundation on the Mississippi River

Minnesota contractor increased welding productivity by 20 percent.

When Xcel Energy decided to rebuild its High Bridge power plant in St. Paul, Minn., engineers knew they needed a very sound foundation. The new plant would house state-of-the-art, gas-powered combustion turbine generators that are extremely sensitive to motion or being out of balance in any way.

The new plant will be equipped with a computer programmed to shut down the 580-megawatt generators if even slight movement or a minor foundation

shift is detected. With operating tolerances down to the millimeter, the turbines must run on a foundation that is completely still and level at all times. The software safeguard will act as a precaution to protect the equipment from potential damage.

Adding to that challenge, the High Bridge site lies on the muddy banks of the Mississippi River - the same location as the earlier High Bridge coal plant - allowing the new generators to tie into the electrical grid there. But for centuries, the Mississippi has shifted, eroded and changed course. The new foundation needed to be anchored into the riverbed rock 90 feet underground.

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Fabrication

To form the plant's underpinnings, nearly 1,200 H-shaped pilings, each approximately 100 feet long, were driven into the earth down to the rock to help serve as the plant's foundation. However, the beams were shipped to the site in 50-foot sections and required welding two sub-sections together end-to-end to form each piling.

Welding 2,400 12-by-12 inch dimensional H-beams in less than 11 weeks required continuous onsite work. Veit Companies, a Rogers, Minnesota-based specialty contractor hired to install the H-beams, knew that its existing engine-driven welder/generators used on smaller jobs probably could not hold up to the rigorous 12-hour days of heavy-section continuous welding operation.

The existing machines required intermittent cool-down time. Additionally, they could not be operated for welding while auxiliary power was used for other tasks, such as grinding. There just wasn't enough power to perform simultaneous welding and generator AC auxiliary power tasks.

Veit began by researching various options with a local welding equipment distributor, Toll Gas and Welding Supply, headquartered in



Blaine, Minnesota with eight locations in the St. Paul area. Veit turned to The Lincoln Electric Company® and its Vantage® 400 engine-driven, diesel-powered welder/generators. Veit General Superintendent Pete Jung quickly discovered that not only could the Lincoln® power sources stick weld continuously under their own power without cool-down time, but that the auxiliary power simultaneously supported other power tools. With the new machines rated at 100 percent duty cycle, Jung estimates that productivity increased by as much as 20 percent.

"I don't think we could have finished the job on schedule and on budget with the old equipment," Jung said. "A lot of manufacturers say their engine welders are 100 percent duty cycle, but when you get down to it, many really aren't."

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The Project

The operation was complex, confined and rapid. Workers were broken into several teams, each responsible for different jobs. One team drove 50-foot pilings down into the ground using a robotic vibrating hammer, leaving about five feet remaining above the ground.

A second team then ground the end edges of the partially buried beams down to 45-degree bevels to prepare them to be welded to a second 50-foot section. They also beveled the ends of the second beam to be added to the first.



While a crane positioned a second 50-foot beam vertically over the first already in the ground, another team tack welded the two beams end to end in a butt weld. Then, a third team finished the job, first by welding three passes on one side of the H-beam joint. Then, the same team arc gouged the joint backside and welded three passes there as well.

The backside arc gouging ensured that each joint had 100 percent penetration. Once three passes were made to each side, an additional four passes were made for a total of seven on each side. In all, 42 feet of weld metal was used on each spliced piling using Lincoln Electric® Excalibur® 7018 (AWS E7018) stick electrode in 3/32, 1/8, and 3/16 inch diameter.

After the two 50-foot sections were fully joined, the hammer team returned and finished driving the remainder of the now 100-foot piling down into the riverbed. A finishing team later trimmed the tops of the piling to surveyed levels.

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Because the riverbed rock sloped slightly, each of the pilings differed in overall length.

However, before the top half of the pilings were hammered into the ground, every inch of selected welds were ultrasonically tested. The tests checked for slag, porosity and any other imperfections. Any defect discovered was reworked.

Advanced Technology

Jung said that throughout the project Veit consumed 16,000 pounds of welding electrode filler metal with a noticeably lower rate of rejected welds. He said much of the improved quality came from Lincoln's® Vantage® 400 power source, based on Lincoln's® Chopper Technology® - a power electronics system delivering improved arc performance used in engine-driven welders and other arc welding power sources.

With Chopper Technology®, DC current is "chopped" at a very high frequency, providing a fast response and tighter output control of the current. This results in an arc that has easy starts, is smooth and stable, with low spatter and excellent bead appearance. This superior arc performance is similar to an inverter-based power source at a more affordable price.

The technology is one of Lincoln's Nextweld® innovations built into many of the company's advanced welding products.

"I've never been on a job that demanded such a high level of quality control," Jung said. "But I'm certainly glad we had the new equipment. The arc was always smooth and the machines just performed remarkably well."

Overcoming Obstacles

The beams weighed 53 pounds per linear foot with a thickness of 0.435 inches on both the web and flanges of the H-beams. Getting the stick electrode inside the corners of the H-beams was difficult because of the configuration, Jung said. Typically only the outsides of the beams are welded for this type of construction, but the project specifications were stringent and required every joint be welded on both sides and then tested throughout.

"I've never been on a job that demanded such a high level of quality control," Jung said. "But I'm certainly glad we had the new equipment. The arc was always smooth and the machines just performed remarkably well".

Added to that, all 1,194 pilings were sunk into a plot of land just 90,000 square feet. They were positioned three feet from one another at their centers. To carry out the work, Veit used three cranes, a 950 Caterpillar® loader, nine Lincoln® engine-driven Vantage® 400 welders and a 12,000-pound forklift - all on the muddy riverbank during the late 2006 Minnesota winter.

Because of the conditions and the project's tight configuration, the job required close coordination and careful planning. Twenty-four pilings were completed each day in an assembly-line fashion among the various teams composed of two to three men each.

Jung added that it was important that the welding machines were able to withstand harsh conditions. And because of the job

requirements, the welding power sources were routinely moved from area to area.

While one team performed a specific job on one piling, other teams worked on other pilings at different stages, allowing all the workers to rotate throughout the site and eliminate downtime.

Had the welding power sources suffered intermittent downtime, the process would have bottlenecked and productivity would be lost, Jung said. Rotating the equipment for additional service more often to replace shutdown welders would have further added to the delays.

Over the 11 week period, the welding teams from Veit laid over 50,000 linear feet of stick weld metal (SMAW) under very tough conditions. With 20 percent productivity gains on a complex job that was completed on time, Jung said he was very pleased with the work accomplished.

"I'm not sure what would have happened if we had gone a different route," he said.



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Featured Lincoln® Product



Vantage® 400

Compact, Multi-Process, Excellent Value

The Vantage 400 is one of the most compact 400 amp engine-driven welder/generators in the construction, pipe or rental fleet market today. It's also one of the most quiet, with a smooth running 4-cylinder Perkins® diesel engine. Use this multi-process welder for arc gouging with up to 5/16" carbons, stick welding with up to 1/4" electrodes and CV wire welding with up to 3/32" wire. You'll value the superior arc performance delivered by Lincoln  Chopper Technology. You'll also appreciate VRD™ (Voltage Reduction Device™), which reduces OCV (open circuit voltage) in the CC-Stick weld mode for added safety.

This model efficiently generates 19,000 watts (peak) of 3-phase or 12,000 watts of 1-phase AC generator power for your lights, grinders and power tools. And, it's housed in a rugged, low maintenance stainless steel enclosure and loaded with many innovative service features. That all totals up to excellent value!