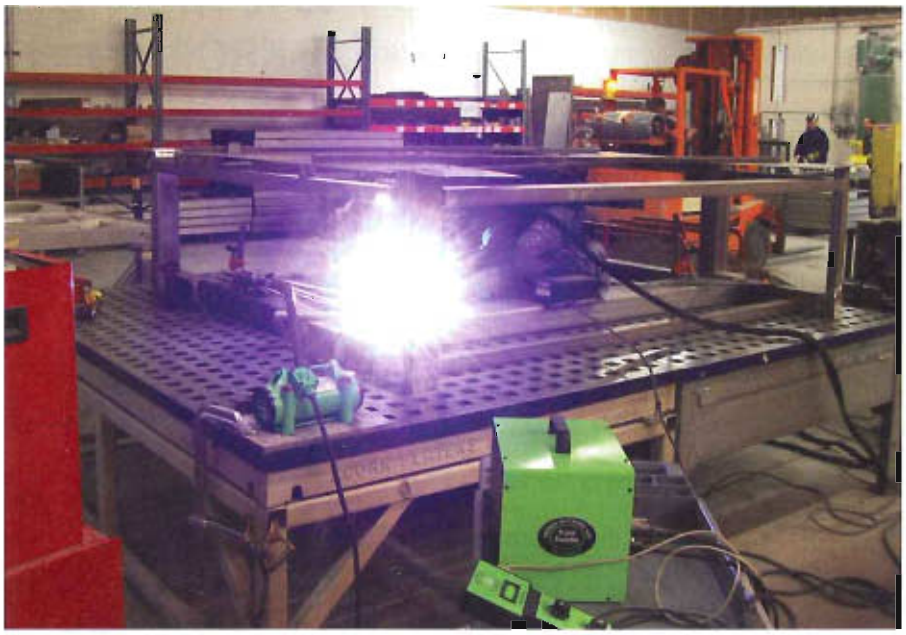
Shop Finds the 'Holy Grail' of Welding

A metal fabrication shop looked for a secret weapon to give it an advantage over the competition and found it with subharmonic technology



Welding with subharmonic technology gave Peninsula Metal Fabrication an edge over their competition

Peninsula Metal Fabrication, San Jose, CA, wanted to beat its competition. A request for proposal pushed it into an unfamiliar technology and gave it an edge. The company makes advanced precision assemblies. It is known for expertise with welding frames, chassises, and sheet metal.

Peninsula Metal management attends trade shows to stay abreast with technology. At the American Welding Society show in Dallas, the Peninsula Metal team saw a demonstration of Pulse Puddle Arc Welding from Bonal Technologies, Inc., Royal Oak, MI. Pulse Puddle Arc Welding – PPAW – helps solve welding distortion and cracking by using subharmonic vibration technology. Using its Meta-Lax vibration stress-relief technology, Bonal developed the PPAW product line specifically for welding and fabricating .

Two weeks after the show, Peninsula Metal was preparing a quote and found the request for proposal specified vibratory stress relief during welding. Peninsula Metal did not have a system to provide this type of stress relief. The company usually sent parts out for heat treatment, but it was time-intensive, expensive, and not possible during the welding process.

To qualify for the quote, Peninsula asked Bonal Technologies for a PPAW unit to test the technology. PPAW technology promised less straightening, rework, preheat, and fewer secondary steps.

The "Wow!" Factor

"We had customers interested in finding a weld shop with subharmonic stress relief technology. We were amazed at how the technology worked," Paul Eischens, Peninsula Metal weld manager, said.

"The bulk of our work is stainless steel. We tend to get a lot of distortion and squareness issues. We hoped the product would help with distortion control. We not only found we got less distortion, we also got better penetration. PPAW helped us speed up production time and cut down on our setup time."

PPAW creates a pulsating weld puddle while the liquid weld metal is deposited. An optimum energy level pulsates the weld puddle. The puddle pulsation creates a fine weld grain structure and more homogeneous mix with fewer columnar structures. Fewer columnar structures improve the weld metal's mechanical properties, making the metal more ductile – up to 400 percent – while increasing impact strength up to 75 percent for better crack resistance.

With increased weld speed, the company reduced overtime 10 to 15 percent

"We're fortunate that upper management is forward-looking with a long-term view of our business. When we saw the benefits of PPAW, they said we needed one for every bench," Jim Scocca, Peninsula Metal plant manager, said. "We now have six units."

The system's wand controls the pulsator speed and pulse

Continued on page 18

level adjustment controls. A sensor is mounted to the workpiece that monitors and sends the pulse strength to the control system. The wand lets the operator adjust the pulse rate for welding. The pulsators, which are clamped to the part, fixture, or table, are available in four sizes to treat weldments weighing up to 40,000 lb.

"The pulse system played a key role in making [us] more competitive since it saved as much as 15 percent on finish machining . . ."

Mobility

Peninsula Metal has the units on individual carts for mobility. They move from bench to bench around the shop. Peninsula Metal sets the parameters so welders don't have to make changes.

"We clamp it to the table, press the button, and it works," Eischens said. "Originally we thought the technology would be cumbersome, but I was surprised at how easy it was. Within 24 hours it was up and running. We're a lean manufacturing shop and this technology falls in line with our methodology. After minimal training, our welders do the process themselves."

The system gives the shop a competitive edge, offering more flexibility and faster production.

"The quality of our welds is so much better it's like night and day," Eischens said.

"Faster speed, better penetration, and less straightening are the holy grails for improving welding," Scocca said. "We have less straightening time after the weld because the frame is stress-relieved during welding. Our welds are 15 to 20 percent faster. We can increase weld speed because of the better penetration."

The pulse system played a key role in making Peninsula Metal more competitive, since it saved as much as 15 percent on finish machining now that its weldments are stress-relieved during welding. With increased weld speed, the company reduced overtime 10 to 15 percent and decreased production costs two to three percent.

"With PPAW our quotes beat the competition. We do less straightening and involve less labor," Scocca said. "We know weld quality is much better with less effort. We plan to retrofit our robotic welder with the system, too."

Chamfering and grinding of the base were reduced, but the welders get the same amount of weld penetration.

"Our quotes reflect a more competitive cost without increased lead time," Scocca said. "The heat-treating cost factor is gone. On average we see about a three percent savings per frame. Since we're in a hyper-competitive environment, this means the difference between getting the job and not getting it."

Input from the Floor

One of the significant factors in adding more PPAW units was welders' input.

"Our welders were surprised since they hadn't heard of this technology," Eischens said. "We performed test cases where we welded with and without the system. There was a noticeable difference. That convinced us to buy more systems."

One of Peninsula Metal's customers orders speaker grids for large concert venues and churches. The grids are made from 1' aluminum bar and welding the grids in the usual manner created distortion.

"Implementing PPAW made a huge difference in the quality going out the back door," Eischens said. "Our customers definitely noticed."

Data from Bonal shows PPAW welds have almost 22 percent ductility value, compared to 5.5 percent ductility for welds made without the system.

Plates welded with PPAW have been found to be 307 percent more ductile than untreated weld plates.

The Pulse Puddle Arc Welding system was so successful in manual welding that Peninsula Metal Fabrication will be installing it in its robotic welding cell

According to a U.S. Department of Energy 1989 report, standard mild steel welds have a weld joint strength of 45,800 psi. By comparison, weld joint strength was 89 percent higher – 86,500 psi – when subharmonic technology was used during welding. *Bonal Technologies*

www.rsleads.com/707mn-201
or Circle 201 for more information

What do you think?

Will the information in this article increase efficiency or save time, money, or effort? Let us know by e-mail from our website at **www.ModernApplicationsNews.com** or directly e-mail the editor at **pnofel@nelsonpub.com.** ■