

Process Boosts Welding Quality

Reading Company Licenses Advance

By Mike Boyer
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Products ranging from automobiles to airplanes might someday be assembled using a revolutionary metal-joining technology being pioneered by Reading's General Tool Company.

General Tool, which does complex machining work for the government and private industry, has licensed the technology, known as Friction Stir Welding, from the British inventor and is developing its ability to build welders for other companies.

"We're a leader in applying the technology," said John D. Cozad, chief operating officer for the company, which employs about 250 at plants in Reading and Woodlawn. Instead of using fasteners and rivets, which are prone to corrosion, major airplane structures could be welded together, Brian Bishop, General Tool Business Unit Manager, said. Automakers could also use the technology to make lighter-weight and more fuel-efficient aluminum vehicles.

General Tool, which has applied for patents for several innovations it has developed, is putting the finishing touches on three machines that Lockheed Martin Corp. will use to assemble the huge external fuel tanks for NASA's Space Shuttle in New Orleans. Traditional welding techniques melt a filler wire with intense heat to bond metal pieces. But Friction Stir Welding requires less heat, no filler wire or gases and dramatically reduces the distortion of the metal from heating it.

The technology produces welds that are stronger and more durable than other techniques, and it can be done faster, resulting in less cost.

General Tool has won a couple more contracts to build custom machines and is developing plans to market its own line of machines called Accustir.

Mr. Bishop said, "This technology has the potential to significantly change the way airlines are built."

Boeing Co. already has used the process to make the booster fuel tanks for its Delta rockets, and a Norwegian company has built a welding machine to build ship decks and bulkheads.

Two of the welding machines that General Tool designed and built specifically to assemble the space shuttle fuel tanks stand 27 feet high and weigh 135,000 pounds each. They will be delivered in the next couple of months to Lockheed's Michoud Space Systems plant in New Orleans.

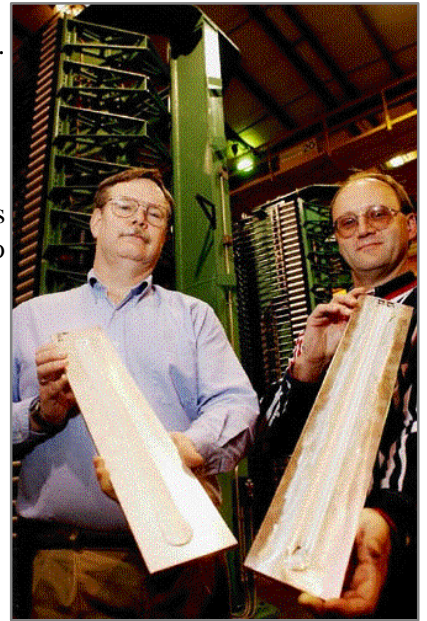
The welding process, developed in 1991 by The Welding Institute in Cambridge, England, uses heat generated by friction and pressure to fuse the metal.

Jack Thompson, General Tool's Senior Design Engineer, said the technology is particularly useful in joining aerospace aluminum alloys, which have traditionally been difficult to weld.

"This process welds the aluminum at about 900 degrees Fahrenheit, while aluminum melts at about 1,150 degrees," he said. Too much heat can weaken the metal joints, he said.

Mr. Bishop happened upon the process in 1999 while investigating welding techniques to build aluminum structures for a laser fusion project General Tool is doing for the University of California's Lawrence Livermore National Laboratory.

"We started building our own machine in July of 1999 and did our first welding just before Christmas that year," he said. The success of that effort led to an invitation by Lockheed Martin to bid on the space shuttle project, which General Tool subsequently won.



Jack M. Thompson (left), Senior Design Engineer, and Brian Bishop, Business Unit Manager for General Tool Company, in Reading show metal welded by the Friction Stir Weld tool built for Lockheed for the space shuttle.
(Ernest Coleman photo)