

SEPTEMBER/OCTOBER 2014

Wire & Cable Technology

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Serving manufacturers, processors,
distributors and users of wire and cable

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Wire Harness & Cable Connector

Focused News, Information and Products for
Wire & Cable Processors, Distributors and End Users.

Presented by:
Wire & Cable
Technology

September/October 2014

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High-Performance Welding of Tin-Coated & Oxidized Wires & Terminals

Janet Devine, President
Sonobond® Ultrasonics
www.SonobondUltrasonics.com

The ultrasonic technology available from **Sonobond Ultrasonics**, West Chester, PA, USA, provides the only ultrasonic system capable of welding the tin-coated wires and terminals essential to electrical applications for high-temperature, high-humidity and other environmentally challenging conditions. Tin-coated copper wiring is preferred for marine motors and electronics, appliances, solar panel wiring and some automotive applications. Only Sonobond's ultrasonic units can achieve consistently reliable welds that remain highly conductive without sacrificing the protective properties of the tin coating.

Thanks to our unique Wedge-Reed System, patented in 1960, we can provide the most durable and precise welds of any ultrasonic metal welder manufacturer. This exclusive capability sets us apart from our competitors.

Advantages of the Wedge-Reed System

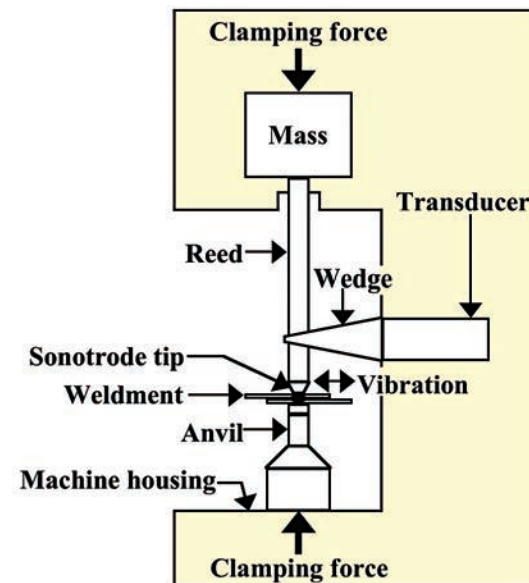
Sonobond's Wedge-Reed System was specifically designed for high-impedance metal welding. It combines low vibratory amplitude with high vibratory force, directed in a shear mode parallel to the interface of the materials to be welded. The shear mode is essential for ultrasonic metal welding.

The Wedge-Reed System uses a vertical, vibrating reed, driven by a wedge-shaped coupler and transducer assembly that's perpendicular to the reed. With the line of static clamping force directly above the parts to be welded, high clamp force can be achieved without bending stress or stalling. The tin coating is dispersed and the copper wire is welded without compromising the conductivity of the copper.

Ineffective Results with Welders Designed for Plastics

In contrast, competing welders use a lateral drive system, combining high vibratory amplitude and low vibratory force, designed for low-impedance

Sonobond Ultrasonics' Patented Wedge-Reed System



for Ultrasonic Metal Welding

Sonobond's Wedge-Reed System, designed for high impedance metal welding, combines low vibratory amplitude with high vibratory force directed in a shear mode. It uses a vertical, vibrating reed, driven by a wedge-shaped coupler and transducer assembly that's perpendicular to the reed. With the line of static clamping force directly above the parts to be welded, high clamp force can be achieved without bending stress or stalling.

plastic welding, but rotated 90° to provide the shear motion necessary for metal welding. The welding tip is part of—or attached to—a longitudinally vibrating transducer horn assembly driven parallel to the metals being welded.

Because of its cantilevered approach, clamping force is applied some distance from the weldment, resulting in a bending moment on the coupler that limits static force. While this lateral positioning works for many applications, it does not produce acceptable welds for tinned or oxidized wires and terminals.

The Sonobond Difference

By definition, the impedance is proportional to vibratory force and inversely proportional to vibratory distance or amplitude. With Sonobond's Wedge-Reed System, the vibratory amplitude is about one-third and the vibratory force is about three times that of

a lateral drive system operating at the same power level, resulting in an impedance value about nine times that of the lateral drive system. Since the density of the material being welded determines the load impedance, the Wedge-Reed System provides a much better impedance match to a metal weldment than a lateral drive system because most metals are six to nine times more dense than plastics.

Reducing Cost & Increasing Efficiency

Previous production methods for tin-coated assembly have included mechanical crimps and resistance welding, but neither provides acceptable results.

Mechanical fastening is inconsistent and resistance welding or soldering use more energy and often produce inadequate bonding. Our ultrasonic method is less expensive, uses a fraction of the energy needed for resistance welding, ensures *RoHS* compliance, which is problematical with soldering and speeds up the production process.

Sonobond Equipment Options

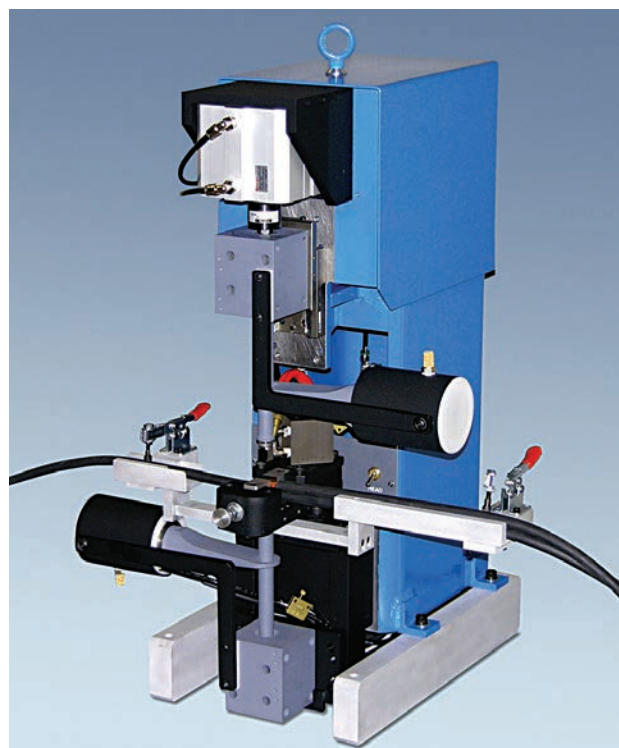
Sonobond Ultrasonics offers a variety of ultrasonic welders that handle a range of wire bundle sizes starting at 1 mm². Its SpliceRite™ units provide one-pulse wire splicing of up to 100 mm² in stranded bare copper wire and tinned wire to 60 mm². Its SonoWeld® and Dual Head Spot Welders can be custom tooled to suit special configurations such as wire to terminal applications. Sonobond's equipment also welds tinned wire to other bare and coated wires or terminals, completing most assemblies in less than one second with minimal operator training.

All machines feature a microprocessor controller that can program welds by height, energy or time, and store and recall up to 250 jobs. Plus, all units have heat-treated, taper-lock tips that are able to be redressed and can produce up to 100,000 welds before being discarded. They're easily replaceable without requiring machine readjustment or calibration. Additionally, Sonobond equipment offers automatic frequency control and overload protection, and can detect and prevent wrong-part or no-part welding when equipped with an optional distance measuring device.

Free Welding Viability Test

To ensure that Sonobond equipment meets their needs and specifications, manufacturers are encouraged to take advantage of Sonobond's free, no-obligation Ultrasonic Welding Viability Test.

We use materials provided by the manufacturers,



Sonobond's SpliceRite™ units provide one-pulse bare copper wire splicing of up to 100 mm² and tinned wires to 60mm². They also feature easily changeable heat-treated, taper-lock tips capable of up to 100,000 welds and microprocessor controllers that store and recall up to 250 jobs, programming welds by height, energy or time.

enabling them to confirm that our units will deliver the quality welds they need.

Sonobond service and technical support is provided before, during and after installation, ensuring its equipment is properly incorporated into the customer's production process.

Leading the Industry

A pioneer in ultrasonic technology, Sonobond holds more than 150 patents including the first for ultrasonic metal welding awarded in 1960, when the company was known as **Aeroprojects**. In the ensuing 54 years, Sonobond has established and maintained a well-earned reputation for innovative and quality-engineered products. Today, the company manufactures a complete line of ultrasonic welding and bonding equipment used by leading firms in the electrical, automotive, appliance, HVAC, solar, aerospace, filtration, medical, body armor and apparel industries.

For more information on Sonobond's ultrasonic technology, equipment or submitting materials for a free Ultrasonic Welding Viability Test, visit the Sonobond Ultrasonics website listed below.

www.SonobondUltrasonics.com

WHCC

Tinned wires...

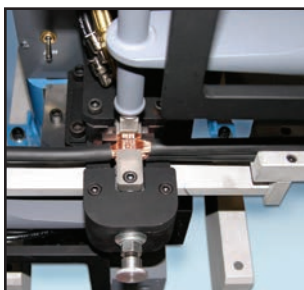
...*can* be ultrasonically spliced with our welders

60mm²

We'll prove it with *free sample welds*.

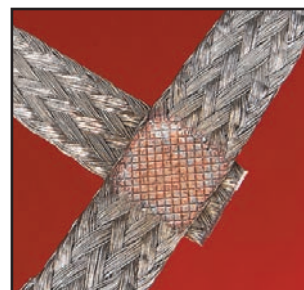
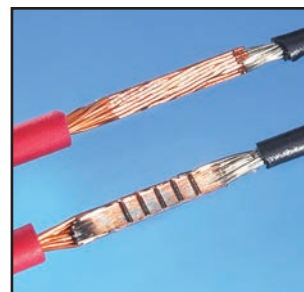
Only Sonobond delivers these ultrasonic welding advantages...

- **Exclusive tin-coated wire splicing**, as well as welding aluminum, copper, nickel alloys, precious metals and dissimilar metals.
- One-pulse wire splicing up to **100mm²** and **tinned wire to 60mm²**.
- Spot welds and wire-to-terminal welds also delivered **in a single hit**. Welding by time, energy, or distance.
- Durable Taper Lock tips that last up to **100,000 welds**.



- Fast, easy tooling changes with **no re-calibration** required.

There's no cost or obligation to send us your specific materials for sample welds! You'll see the results before you buy the unit that's right for your application. So contact us today!



SONOBOND® **ULTRASONICS**

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