

Ultrasonic technology supports the development of innovative trends

Lightweight construction, electro-mobility, packaging, 3D printing and Industry 4.0

PLASTIC WELDING

METAL WELDING

CUTTING

CLEANING

SCREENING



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Ultrasonic technology is probably best known from the diagnostic field, where it is used to create images of unborn children. However, ultrasonics are also used in many industrial processes, for example, to join or cut plastics and metals as well as to separate, cut or screen. There are good reasons for this: The processes used are environmentally-friendly, energy-saving, as well as quick and inexpensive. Such characteristics are very much in demand in current topical issues, such as lightweight construction, electro-mobility and 3D printing, but also in the packaging and foodstuffs industries as well as in medical technology. As a pioneer in ultrasonic technology, Telsonic has developed production-ready ultrasonic solutions for these applications that are now used in a wide range of industries worldwide. No two applications are the same, the ultrasonic specialist also offers torsional welding technologies and various screening processes in addition to longitudinal welding.

The ideal joining technology for lightweight construction

Lightweight construction is an important trend in the automotive industry (Figure 2). New materials and thin-wall technology are used here, for which the SONIQTWIST® ultrasonic welding technology is ideally suited, such as in vehicle bumpers made from polypropylene (PP). This patented and extremely gentle welding process enables wall thickness to be significantly reduced (<2.5 mm) without visible marks on Class A surfaces of already lacquered vehicle parts. Magna Exteriores, for example, a globally active Tier 1 supplier of cladding components and systems, started using the process as early as 2017 in its production process and the following year received the Automotive SPE and ACE Innovation Award (1st Place: Category "Enabler Technology"). It recognises outstanding achievements in industrial products and processes that play a pioneering role in the industry.

Other applications in the automotive industry also benefit from the torsional welding process, which integrates superbly into various automation concepts.



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- 01 Additive manufacturing (3D printing), powder recycling
- 02 Torsional welding of sensor brackets to lightweight bumpers
- 03 Torsional metal welding of high-power contacts
- 04 Cutting and welding of fleece foils



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Modern-day vehicles use round aluminium cables (Figure 3) more and more frequently for the secure power supply from the battery in the back to the engine compartment. To ensure that the contact in the engine compartment is secure, a connecting bolt with a screw thread is welded onto the aluminium on the front end of this so-called busbar. The ultrasonic welding process then lasts only about one second, which allows the aluminium busbars to be produced in large numbers within a short time. Currently, the values are around 700,000 parts per year for each system.

Ultrasonic technology is driving electro-mobility forward

In the manufacture of batteries for electrical vehicles, the strengths of ultrasonic technology are apparent in two key processes (Figure 5). Thus, ultrasonically-stimulated screens with a precisely defined mesh size filter the carbon for the anode and the lithium metal oxide for the cathode, in order to achieve the most homogeneous distribution of the components possible. The SONIQTWIST® or PowerWheel® torsional ultrasonic welding processes then ensure contact between the foils of the batteries and link the arrester to the external connections. Thanks to the slim sonotrodes which approach from above, interfering contours can be taken into account and welding can be done securely even in very confined spaces. Sensitive materials are no problem either; the extremely thin copper and aluminium films, for example, do not get damaged during the welding process. For this reason, the systems are not only used in lithium ion batteries for vehicles – they have also been in high demand in mobile phone battery production for some time now.

Economical, quick and environmentally-friendly packaging

The high production rates require fast and economical procedures when packaging liquids or bulk goods (Figure 4). Ultrasonic welding is therefore a good choice for several reasons, since it can be used to seal beverage cartons, coffee capsules and stand-up or tubular bags reliably, quickly, gently and tightly. Here, another advantage comes into play: ultrasonics can also be used for cutting, which means that punching and sealing are possible within a single work step. Apart from longitudinal welding, torsional welding technology is also available for demanding tasks, depending on the application.



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- 05 Metal and plastic welding and screening with ultrasonics in battery production
- 06 Real-time data exchange and control of PLC systems
- 07 MAG digital ultrasonic generator

Powder processing in 3D printing

In 3D printing, powder residues accumulate constantly during the operating process (Figure 1). To reduce waste to an absolute minimum, these are recycled. The valuable powder must meet the most stringent of quality requirements. Using ultrasonics, processing units screen fuse melts and other impurities from the metal powder. The screens are adapted to meet the individual requirements of each powder processing unit. This offers high process reliability, efficient cleaning of the screen and screening material without any clogging of material.

Telsonic Ultrasonic technology is ready for Industry 4.0

In this, the principal focus is on the technological architecture of the MAG ultrasonic generator (Figure 7), which supplies the energy for the welding processes. Industrial bus systems form the basis for data communication. The fully digital generators have USB and industrial bus interfaces. Bus modules that can be fitted quickly and easily exist for EtherNet/IP, ProfiNet, Sercos3, EtherCAT, Powerlink and Profibus. The generators can easily be configured and controlled via these modern bus systems. The welding results, such as weld duration, peak power as well as weld and power curves, are available at the controller in real time. The configurable results window enables comprehensive process control.

by Dirk Schnur, Chief Marketing Officer at Telsonic AG and Ellen-Christine Reiff, Redaktionsbüro Stutensee



Additional information
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Powder recycling process 3D printing
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