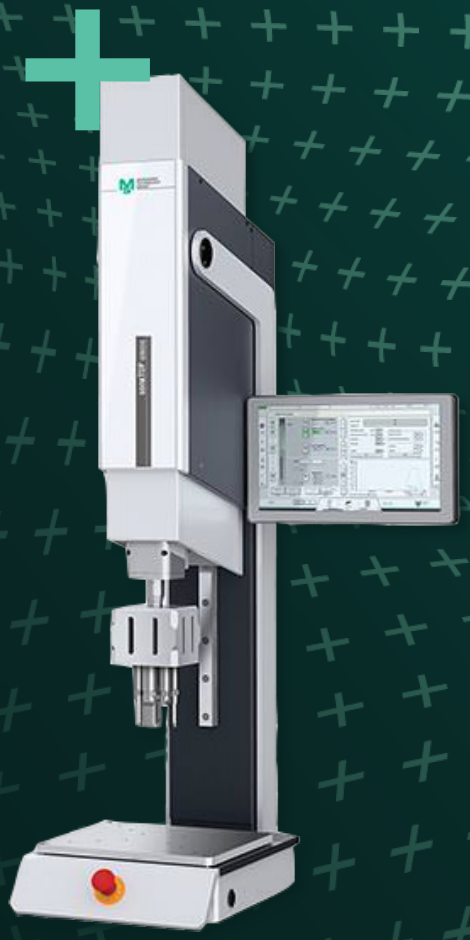
ULTRASONIC TECHNOLOGY GROUP

GUIDE TO

Ultrasonic Plastic Welding

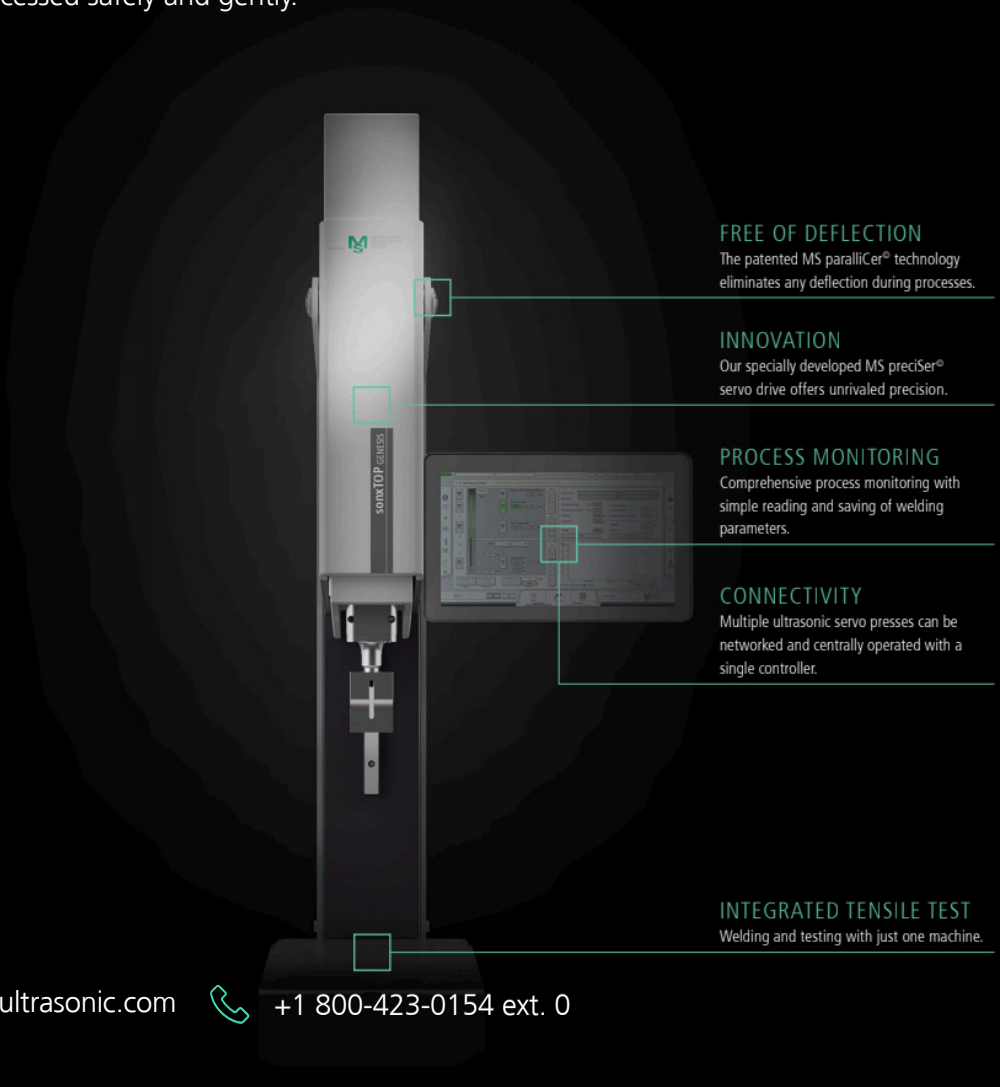


Ultrasonic plastic welding is a method of cleanly sealing two thermoplastic parts together using high-frequency vibrations. The process relies on a generator to produce a high-frequency alternating voltage from an applied supply voltage. This is then translated into a mechanical oscillation using a converter. The frequency of the oscillating movements ranges from approximately 20 kHz to 50 kHz.

An ultrasonic plastic welder's sonotrode, or horn, is the tool that directly touches the thermoplastic materials and facilitates the weld. Through the oscillation at its surface, the sonotrode introduces energy into the components. This energy causes heating to occur along the boundary surfaces of the two individual components to be joined and does not affect their adjacent areas. This means that the components are processed safely and gently.

A strong bond is formed during the brief milliseconds it takes for the joining pieces to cool. The result is a clean and stable joint between two individual plastic parts. Ultrasonic plastic welding technology can also be used for cutting or separating a wide range of materials. In these applications, ultrasonic equipment produces clean and flawless cut surfaces.

As a trusted manufacturer of ultrasonic plastic welding technology, MS Ultrasonic Technology Group can help you implement the most advanced ultrasonic plastic welding equipment into your industry's applications. In this eBook, we will explore the most common applications of ultrasonic plastic welding, as well as the benefits it provides and the unique advantages of servo-electric drive welding technology.



Applications of Ultrasonic Plastic Welding

Ultrasonic plastic welding is a highly efficient solution for joining and separating materials throughout many industries. Since it doesn't cause any damage to the product itself, it is particularly useful in applications where clean joints and smooth surface finishes are important. Some of the most common applications for this equipment are found in the automotive, medical, textiles, food, and consumer goods industries.

Automotive

To remain competitive, automotive manufacturers must balance productivity and innovation, all while adhering to rigorous quality standards. Ultrasonic plastic welding is easy to integrate into high-volume part production and generates higher-quality plastic components for many vehicle parts, including door panels, bumpers, instrument panels, engine components, and spoilers. Compact yet robust, the modular MS sonxMAC ultrasonic systems line offers automated continuous welding as well as gluing, deep drawing, and embossing for automotive exteriors, interiors, and small automotive parts for OEMs, Tier 1, and Tier 2 suppliers. Its high process speeds allow for increased productivity while maintaining quality and lower reject rates for our automotive clients.

Medical

In medical applications, ultrasonic plastic welding is valuable because it eliminates the need for adhesives and chemical solvents, which might not be biocompatible. It can also achieve the tight tolerances and repeatability necessary to produce quality components for critical healthcare applications. Many types of medical devices are composed of multiple small parts that must be joined cleanly. The welding process is applicable for minimally invasive surgical instruments, such as catheters, cannulas, and trocars, as well as products like blood packs, saline packets, and sterile packaging. MS Ultrasonic has optimized the physical equipment design, the internal and external documentation, and the software capabilities of our machines specifically for the precision that medical device manufacturing requires, allowing for accurate tooling positioning within 10 microns. Ultrasonic plastic welding is compatible with clean room processing and manufacturing, as well, processing types according to the FDA and ISO 14644-1 and -2.

Textiles

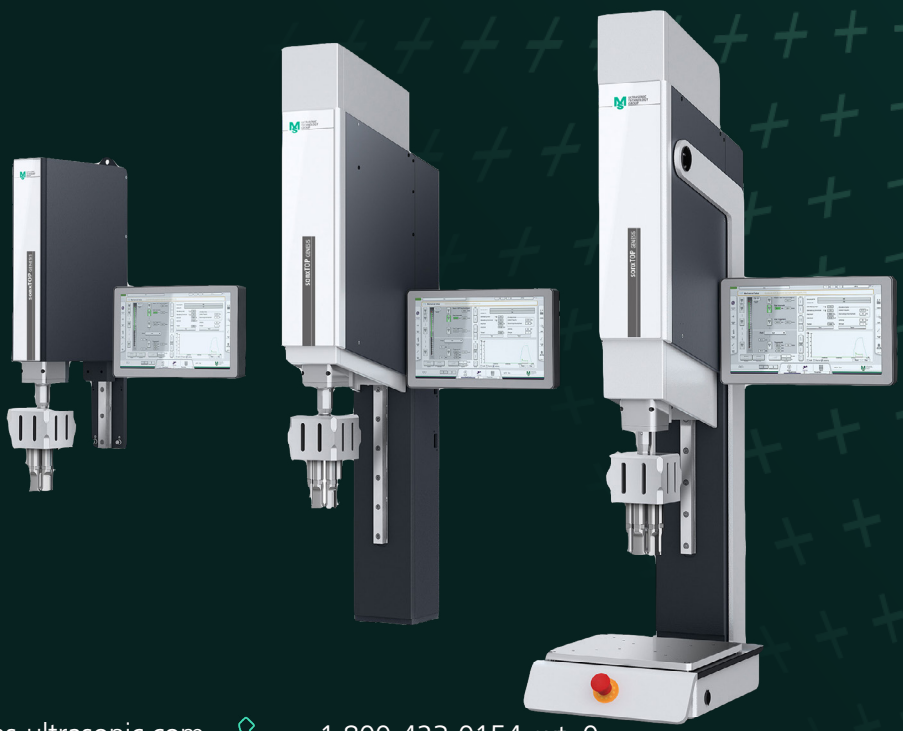
Ultrasonic plastic welding is also an effective technology for joining fabric materials and nonwoven edge fibers. Our modular equipment solutions are capable of producing a range of goods, including filter fabrics and membranes, hygiene products, canvas and awnings, and hook-and-loop fasteners. It's simple to incorporate within your existing system for faster results.

Food

Another common application in which our ultrasonic plastic welding technology excels is food and beverage packaging. MS Ultrasonic's systems emphasize efficiency, cost-effectiveness, and food safety in this industry. They produce fast and consistent seals in tubes, foil pouches, and cartons for consumable goods like coffee and tea while preventing contamination. This welding equipment can also cut through food itself, creating precise cuts through cheese, cakes, tarts, and more.

Consumer Goods

Consumer goods must be not only functional and durable but attractive and safe as well. In consumer goods manufacturing, our ultrasonic plastic welding machines create products with excellent aesthetic quality and the highest safety standards. Consumer goods include washing machine covers, toys, and sporting equipment. Our MS Ultrasonic systems can even produce electronic components for household appliances.



Benefits of MS Ultrasonic's sonxTOP Line of Ultrasonic Plastic Welding Machines

Our MS sonxTOP ultrasonic plastic welding machines are at the leading edge of the market with Industry 4.0 digital networking and communication protocols available for automation. MS Ultrasonic was the first company to have full communication over Ethernet IP, and we also use EtherCAT, Profinet, Profibus, and more. Key benefits of the sonxTOP line include:

- Intuitive, Easy-to-Operate Technology
- Optimal Repeatability and Changeover
- Suitability for Joining Thermoplastic Components
- Fully Sealed Weld Generation with Higher Average Bond Strengths
- No Need for Additional Materials like Glue to Form Bonds
- Low Production Costs
- Curing that Takes Only Milliseconds
- Low Fault Rate
- Energy and Material Efficiency

The sonxTOP ultrasonic welding machine line is fully adaptable and scalable, able to fit right into your production line for full in-line capabilities. Our MS Sequence software package is accompanied by a human-machine interface (HMI) with optimal processing overhead. It's capable of integrating, running, and managing inputs/outputs, XY tables, scanners, part-in-place sensors, servo- or air-driven actuators, and external testing tied into the welder without the need for a third-party programmable logic controller (PLC).

As for the physical design, the line's digitally controlled, toolless switchover allows for simplified operations as the user won't need to move any tooling and there are no levers to loosen. Our patented paralliCer® external housing fixture for plane-parallel welding delivers maximum process reliability even under high welding forces. Additionally, our patented stabiliZer® internal frame, which is integral to the stand, and our highly accurate preciSer® servo drive produce precise, repeatable, high-strength weld seams. Both eliminate any deflection during processes, maintaining full parallelism and contact between the sonotrode and the workpiece.

Advantages of Servo Electric Drive Welding Technology

At MS Ultrasonic Technology Group, our MS sonxTOP servo-driven ultrasonic machines offer as much as 75% energy cost savings over machines using compressed air. This technology creates a savings of around 80% compared to pneumatically driven ultrasonic plastic welding machines. In addition, it allows our customers to reduce their scrap rate and improve weld quality. The dramatically higher efficiency of our electrical drive is a result of its more direct movement. It is capable of stepless regulation, producing significant energy savings.

Case Study

One example of the results you can achieve using servo-electric drive technology can be seen in this case study from a previous customer. A client approached us wanting to improve weld quality while reducing the scrap rate. As a solution, his existing tools were installed on an MS sonxTOP. The preciSer® servo-electric drive, paralliCer®, and stabiliZer® facilitated a reduction in scrap rate from 13% to less than 3%.

Our facilities feature two application laboratories and a measurement/analysis laboratory, which allow us to thoroughly test customer applications and optimize our ultrasonic plastic welding results. Our servo-electric drive welding technology provides a number of unique advantages:

- The servo-electrically driven feed unit features a special bearing and guide concept for the highest precision with minimal process adjustments.
- For continuous welding applications, we offer engraving rollers featuring complex welding patterns. These rollers are surface-hardened to enhance wear resistance. We're the only company in our field that makes its own rotary dies.
- MS Ultrasonic delivers turnkey solutions for our customers by building both components and machines, while our competitors must use a separate machine builder for certain parts.

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Why Choose MS Ultrasonic for Ultrasonic Plastic Welding Technology

MS Ultrasonic Technology Group has over 50 years of experience creating the most innovative ultrasonic plastic welding solutions. No matter what your industry, we can help you incorporate a high-performing solution for cutting and joining with reduced energy and material costs. Create strong welds more quickly than ever before with our easy-to-operate equipment. To learn more or get started on your solution, contact our team today.

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About Us

We at MS Ultrasonic Technology Group have a clear, value-oriented corporate culture, demonstrating our commitment as a global, transparent and respected company. The way that we, as the entire MS Ultrasonic Technology Group, behave towards each other and the outside world is very important to us. It is part of our self-image and the way we are perceived by all stakeholders in the company.

LEARN MORE

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