



ULTRASONIC WELDING TECHNOLOGY

**AUTOMOTIVE**

# Ultrasonic welding technology. For the automotive industry.

Plastic materials have gained more and more importance in the manufacturing of vehicles. The requirements for plastic components, with respect to visual appearance, geometry, function, and material properties have become increasingly demanding. Plastics have advanced to become modern, top-performing materials. Amorphous and semi crystalline plastics are increasingly being combined with a large variety of other materials. The shorter life cycles and reduced development time of products require continuous synchronization to successfully meet production start-ups in a timely manner.

Herrmann Ultrasonics is a world-leading company in the field of ultrasonic welding. For our customers, we assume the role of both consultants and application problem solvers with regard to the ultrasonic joining of plastic materials. In addition to leading-technology products, we provide excellent, in depth application services for solving joining tasks, particularly taking into account the economic aspects.

Indicating instruments

Lights

Decorative trims

Acoustic absorbers

Filters

Linings

Valves



# Ultrasonic welding of automotive components. As specific as the product itself.



Engine compartment components

Interior components

## Optimized solutions. For your specific requirements.

Nowadays, the requirements of components for the automotive industry have become increasingly complex: Tightness, strength, accurate dimensions, and the impeccable visual appearance of surfaces are typical quality criteria. In order to ensure cost effective manufacturing with low energy requirements, short process cycles and avoidance of rejects are key aspects.

The ultrasonic components and systems, along with application laboratories and technical application oriented experts, provide the basis for efficient, high quality production processes. A high degree of product safety and reproducibility, as well as the selection of available weld process parameters, ensure the highest component finish quality. Herrmann Ultrasonics provides ideal solutions for maximum flexibility in production – from small volume assembly all the way to fully automated production processes.



Exterior components

Functional components

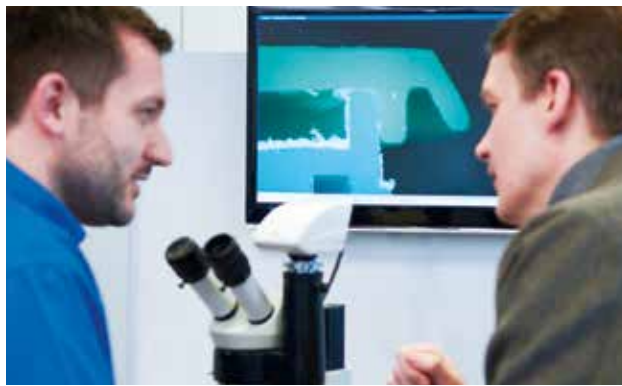
## Typical product requirements. Possible with technology from Herrmann Ultrasonics.

- High strength
- Surfaces free of print marks
- Reliable functionality of components
- 100% tightness
- Dimensional accuracy (clearance)
- Distortion-free
- Low overall component stress



## Avoiding risks – increasing security. Through common development of components.

Experienced technical application-related consulting and development process support by Herrmann Ultrasonics, prevents unnecessary expenses and reduces the overall R&D period. The period between product development and product marketing provides valuable time savings and reduces the "Time to Market".



### Advantage through efficiency. With competent industrial knowledge and experience.

Long-term experience by Herrmann Ultrasonics, with respect to the joining of plastic components in the automotive sector, is an important success factor in component development. Early introduction of Herrmann Ultrasonics specialists in the product design stage reduces experimental processes and costs.

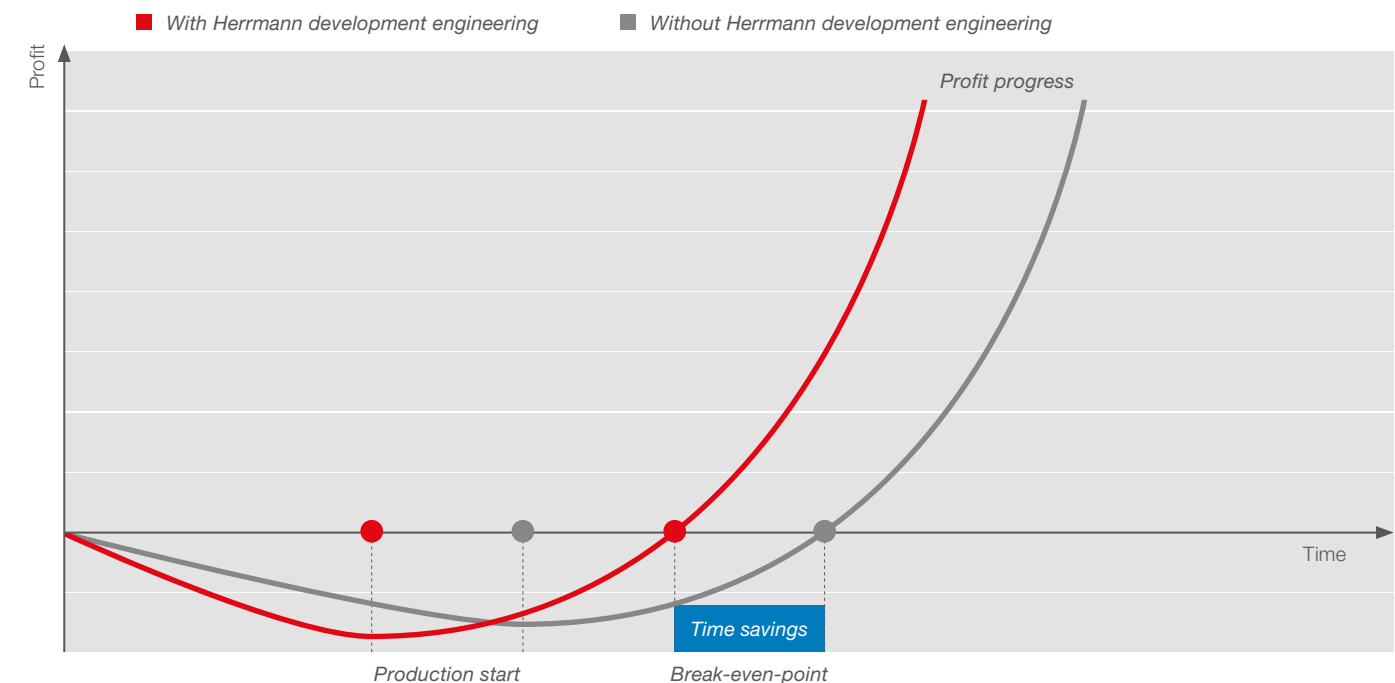
- Data base-supported experience from more than 10,000 successful applications
- Increase of overall component quality through optimum component design

- Reduction of repetitive and expensive modifications and optimization loops for injection-molding tools and dies
- Reliable feasibility studies using test tools, including process documentation
- Early definition of process parameters and implementation into series production
- Support for validation of the weld process
- Pre-series production by means of contract welding
- Consistent weld processes can be reproduced across multiple production facilities worldwide



## Outstandingly efficient. With technical application-oriented advice.

Short development periods are a crucial competitive advantage. By utilizing ultrasonic welding technologies from Herrmann Ultrasonics, break-even points can be met earlier and the required profit range can be reached sooner.



### Environmentally friendly and energy efficient



Ultrasonic welding technology is viewed as being an environmentally friendly technology. In comparison with other thermal joining processes, its overall energy footprint is reduced by 75 %. This is due to power only being drawn during the actual weld time.

#### Properties and advantages

- Very low energy required due to optimum efficiency
- Energy is focused specifically in the area to be joined and only during the actual weld cycle
- Efficient use of energy due to ultrasonics not requiring a heat ramp up or stand by cycle
- No power dissipation through heat radiation as with typical thermal processes



# Highest weld quality. Exterior and interior components.



## Welding of daytime running lights, rear lights, front lights and directional indicators

Highest quality and design requirements particularly apply for lighting elements in vehicles. These include strength, tightness, absolute dimensional accuracy, high-quality and scratch free surface finishing, as well as clear welds and absolute absence of particulate. Typical applications: welding of color filters, reflector elements and cover plates; sealing of pressure balancing elements (PBE).

## Embedding of leather, artificial leather and fabrics into injection-molded parts

Typical applications for which different and non-compatible materials are joined include hand-brake levers, gear-shift sleeves, steering column shrouds, and roll-up sun shields. Strength, good contact with the component, and a consistent joining curve has priority. Even the welding of the most complicated component shapes can be realized.



## Welding of exterior rearview mirrors and door handles

Dimensional accuracy, high-quality scratch and mar-free surface finishes are typical requirements for the joining of these types of vehicle components. The applications are diverse and include welding of light conductors, sensors and covers as well as ultrasonic staking of mirror triangles with aluminum die-cast components.

## Inserting and embedding of metal parts. Staking of grilles, frames and decorative elements

Ultrasonics is not only suitable for joining plastic components with each other, but also for joining plastics and other materials, such as metal. When designed correctly even chrome trim parts can be easily staked using ultrasonics. The key aspects include a high-quality, mar-free surface finish and high overall strength.



## Welding of cover glass plates and trim rings

Cover glass welding of instrument clusters is among the very demanding joining applications, the component must be tight and free of particulates and surface imperfections. Thanks to sonotrode grouping, it is also possible to realize the welding of particularly large instrument clusters. Welding also includes: trim elements, display plates, and pointers.



## Welding of decorative moldings, accentuation strips and running board embellishers, center consoles, and cup holders

Brilliant surface finish and precise gap control are characteristic features of these components, which in most cases have extremely sensitive surfaces. Welding is used for the most varied decorative materials, such as painted plastic materials as well as wood or aluminum in combination with thermoplastic materials.



## Welding of large-surface linings

Strength, dimensional accuracy and consistent compliance gap widths are typical requirements for large components. The requirements for ultrasonics include the staking of attachment parts, inserting of metal bushings, and welding of individual segments to obtain a complete assembly. Typical applications: luggage compartment linings and covers, side linings for doors and seats, glove compartments, wheel arch and underbody covers and foot well linings.



## Highest weld quality. Functional components.



### Welding of mechanical functional components

Complete functionality, without restriction of all integrated elements of the assembly, is the priority when welding such components. These include connections, contacts, and cable assemblies. Compliance with the overall strength specifications for the rear seat backrest locking mechanism, seat belt buckles and other locking devices plays a significant role. Additional applications: ventilation nozzles, kinematics components, such as cup holders, armrests, and ashtrays.

### Welding of electronic and electro-mechanic components into housings

Typical examples are motor controls, motor management, power window and wiper motors, door handles, and switches. The primary requirement: unrestricted functionality of pre-assembled components (i.e. pc boards, connections, solder joints and contacts), tightness, dimensional accuracy, and high strength.



### Welding of safety components

Welding of safety components predominantly entails: 100% supervision and documentation of all weld process parameters! Additional software allows for the authentication of users, including personal user profiles and complete tracking and documentation of the entire process change history, as required by the automotive industry. Typical applications: parking brake levers, airbags, functional housings with mechanical and electrical components.



### Welding of housings

Housings protect interior components from external influences. Functionality of a component is only ensured if it is completely tight. Consequently, the weld seals must be resistant to humidity and temperature variations. Typical applications: controllers, actuators, antenna housings. The requirements: tightness, strength, dimensional accuracy, and functionality of the component.



### Welding of pressure balancing elements (PBE), punching and sealing of membranes

Unrestricted membrane functionality has highest priority for these sensitive components. Prevention of the ingress of water and contamination into the housing and simultaneous balance of pressure are important requirements. The applications: housings for electric motors and drive units, car lights, controller housings and brake servo units.



### Welding of throttle valves (THV)

For throttle valves, it is a matter of tightness, strength and dimensional accuracy, as well as functionality of the enclosed components, such as springs and membranes. Typical applications: pressure regulators for motors, safety technology and fuel valves.



## Highest weld quality. Engine compartment components.

### Welding of filters and filter materials

When welding filters and filter materials, it must be ensured that the filter function is not impaired. The filter material must be firmly and reliably embedded into plastic caps or housings. Typical applications: oil filters, fuel filters, air filters, and fine-dust filters.



### Welding of engine covers

Welding of absorber mats and connection of sub-assemblies are common applications. Another application is the high-quality welding of brand emblems and trim elements, ensuring that the visible surfaces are not marred. Since the components are exposed to extreme temperatures and temperature variations, maximum heat and cold performance of the weld is a critical requirement.



### Functional housings in the engine compartment

Components such as open-loop and closed-loop control valves, cylinder head caps or vacuum elements are subjected to heavy mechanical and thermal loads. The requirements are: tightness, pressure and burst resistance, as well as unrestricted functionality. Welding of glass fiber-reinforced materials amounts to 50 %.



### Form fitting of the plastic components in metal housings

Connection of plastic components and metal housings is also possible with ultrasonics. Examples: seal rings in pump housings or fixation of sub-assemblies. Typical requirements: tightness, strength, and functionality.



### Welding of connectors and sensors

Spark plug connectors, strain relief elements for cables, sensors, and feeler gauges are of critical importance for the functionality and safety of a vehicle. The primary requirements for welding, among others, are high tensile strength, tightness, and electronic functionality. Typical applications: tire pressure sensors, CO sensors, and others.



## Multi-faceted product portfolio. Leading in technology and precision.



Bench top welder



Ultrasonic Welding Systems



Solutions for machine builders

### HiQ product line

The HiQ generation welding machines provide an appropriate platform for virtually any application, any market and any budget. The machine series allows for complex joining methods, is user-friendly and provides for easy handling. Due to the ability of utilizing flexible force profiles, availability of a wide range of process parameters and intelligent system software, customized welding applications can be individually realized.

- Precision
- Diversity
- Efficiency

### Systems and components

Herrmann Ultrasonics provides standard actuators that offer a high level of flexibility that can be easily adapted to individual customer requirements. The Herrmann Ultrasonics modular system offers complete integration solution for machine builders and Original Equipment Manufacturers. The offering can be individual ultrasonic components or complex ultrasonic systems: Every module is a functional unit and allows easy integration and start-up.

- Robust components
- Wide selection
- Adapt to meet customer requirements

### Custom engineering

Herrmann Ultrasonics offers total integration solutions for machine builders. Experienced project management support machine automation concept designs, propose machine work area layout, and perform extensive collision analysis. Array of Sonotrodes for segmented welding applications, accompanying technical vibration calculations, guarantees reliable and fast start-up. Using this method, applications become a customized solution. Many years of design experience available to support your project requirements.

- Customized total solution concepts
- Modular system
- Project management

## Continued support. Consulting and service from the ultrasonic specialists.

The expert teams at Herrmann Ultrasonics will support you during every phase of your project. This includes joint design discussion, component design, pre-production prototype welding in application laboratories, weld parameter definition for verification of the required component properties, training/instruction services and after-sales services. Close cooperation with the customer and efficient product development is the primary focus.



### Ultrasonics lab PLASTICS

#### Application consulting

- Early support for component design
- Support and direction for designing the geometry of the weld joint area
- Principle testing for feasibility

#### Application optimization

- Common trials and tests with the customer
- Determination and optimization of tooling profiles and process limits
- Verification of research results with the help of tensile tests, sealing tests, high-speed cameras, burst tests, microscopy and microtome cuts
- Complete documentation of the feasibility test results

### Training and customer services

- Beginner and expert seminars
- Practice-oriented application trainings
- Trainings on-site or at our local facilities
- Customer-specific trainings

### Technical project management

- Consistent implementation of customer requirements and test results in design concepts
- 3-D supported collision analysis
- FEA-supported tool design
- Mechanical and electrical interface definition
- Guidance on integrating the weld process in the machine sequence

### Tech-Center on site

- Customer-oriented support for feasibility analyses
- Technical centers and application laboratories are strategically located in automotive manufacturing locations worldwide
- Experienced and native-speaking application specialists

### Services

- Optional 24-hour service hotline
- On-site service in the respective languages through our Tech-Center
- Preventative maintenance and servicing measures





**North American Headquarters**

**Global Headquarters**

**Asian Headquarters**

**FIRST CLASS TECHNOLOGY. WORLDWIDE.**



**North American Headquarters**

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