



ULTRASONIC WELDING TECHNOLOGY

BATTERY

Ultrasonic welding technology. For lithium-ion batteries.

Energy storage is one of the current large topics world-wide. A megatrend based on various innovations can undoubtedly be seen in batteries. Lithium-ion batteries (LIB) are one of the future technologies that will continue to change industries and promote growth around the world. E-mobility, mega factories, stationary applications for decentralized energy storage are the boosters for this development. Previously unattainable energy densities and performances are now achievable for a pre-defined volume or weight. And all this with a very high level of safety, availability, and sustainability.

Herrmann Ultraschall 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 nonferrous metals. In addition to leading-technology products, we provide excellent, in-depth application services for solving welding tasks, particularly taking into account the qualitative and economic aspects.



Busbars

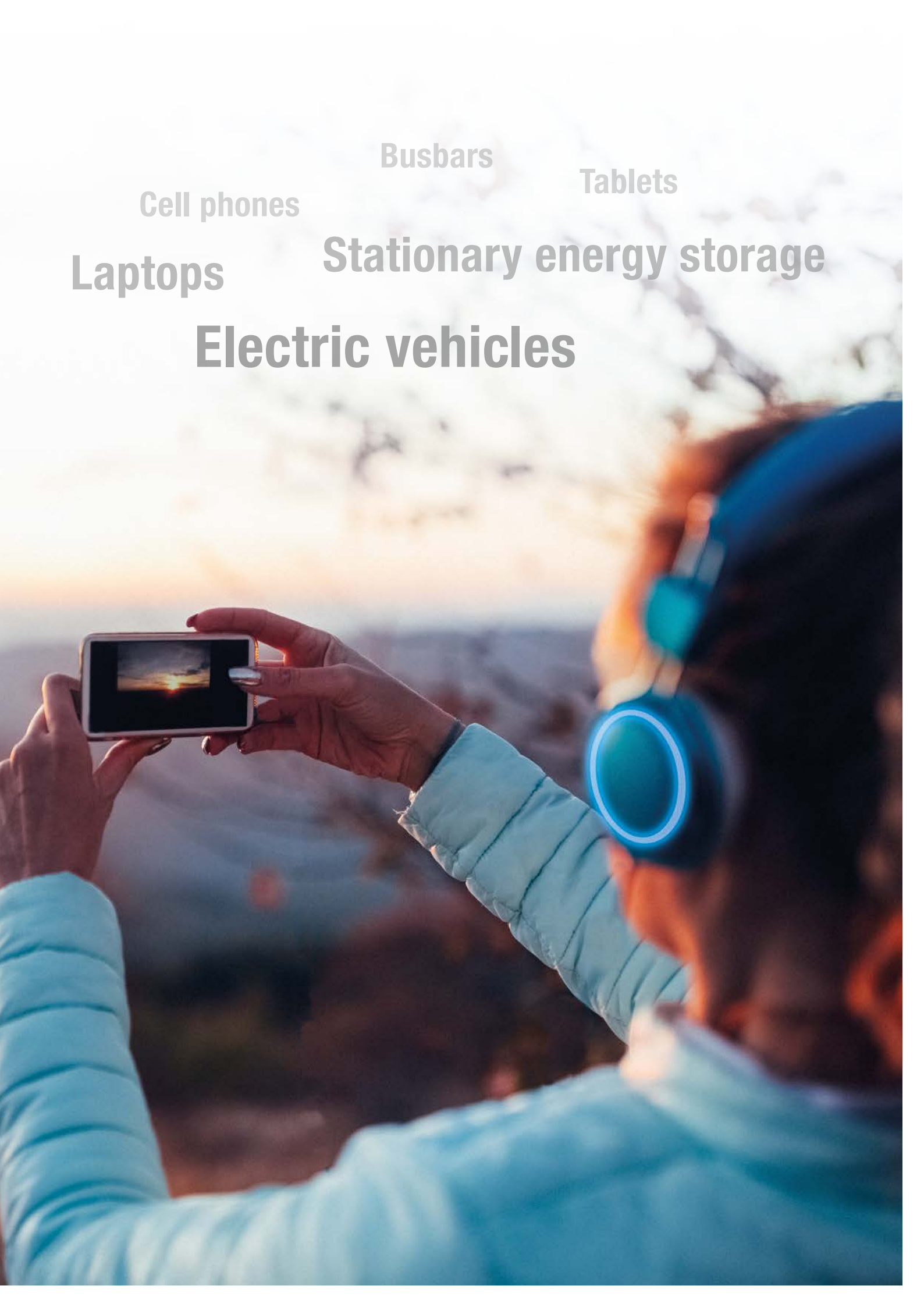
Tablets

Cell phones

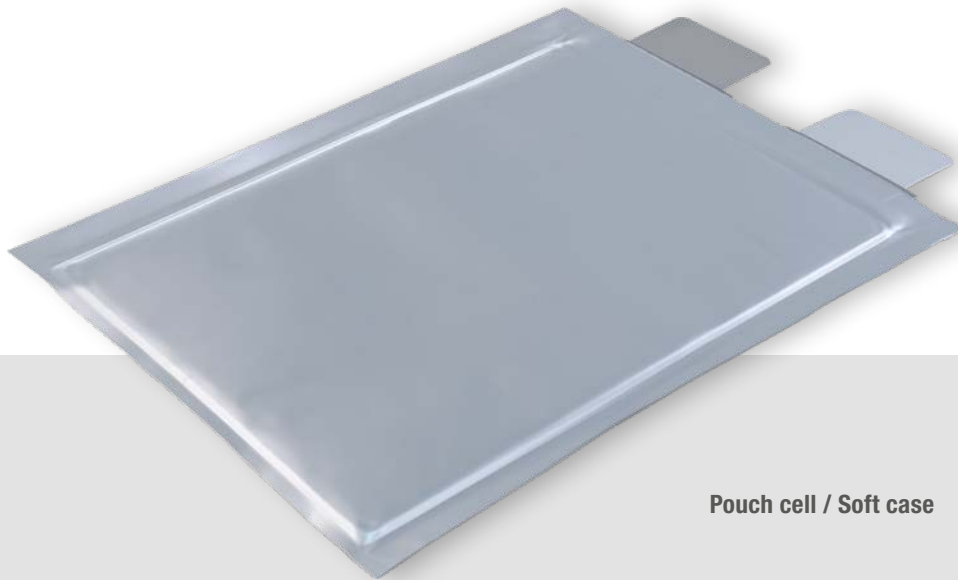
Laptops

Stationary energy storage

Electric vehicles



Ultrasonic welding of battery components. **As unique as the product itself.**



Pouch cell / Soft case

Optimized solutions. For your specific requirements.

Nowadays, the requirements of battery products have become increasingly diverse and complex: In addition to precision, strength, and minimum particle formation, process validation and traceability are equally important quality criteria. In order to ensure high-quality manufacturing with maximum process safety, product design as well as selection of welding parameters play a decisive role and depend on individual application cases.

Ultrasonic welding systems by Herrmann Ultraschall meet the highest standards for weld quality and comply with today's requirements for process monitoring, quality assurance, and data acquisition. The controller technology supports compliance with strictest calibration regulations. High product safety and repeatability are provided in combination with application-specific technical consulting in local ultrasonic laboratories in 18 countries. Herrmann Ultraschall provides ideal solutions for maximum quality in production – from small volume assembly to fully automated production processes.



Prismatic / Hard case



Battery management / Terminal

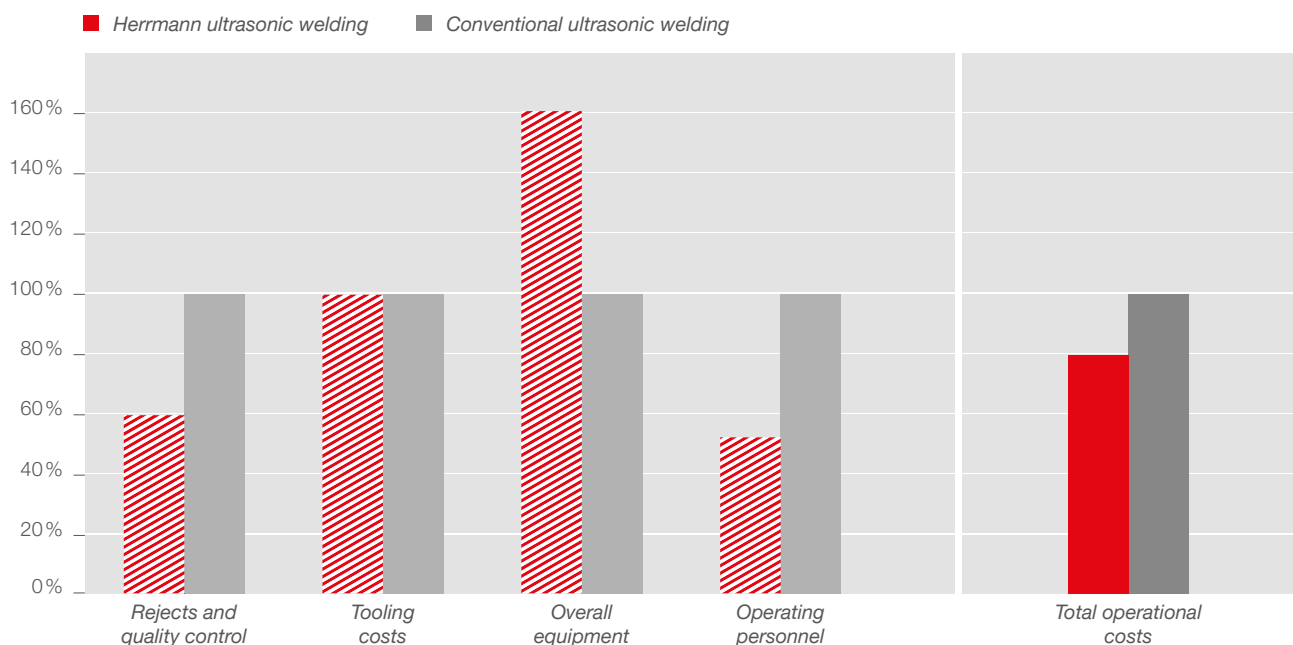
Major product and process requirements. Possible with technology from Herrmann Ultraschall.

- High weld strength
- Process visualization
- Long-term process stability
- Minimum rejects
- Low heat impact / weld temperature
- Reliable functionality of components
- Statistical process monitoring
- Process data acquisition
- Data analysis
- Calibration for compliance with QS

Highly efficient. Due to reduction of operational costs.

A significant reduction in operational costs for the ultrasonic welding of materials with Herrmann Ultraschall guarantees an increase in machine OEE (overall equipment effectiveness) compared to existing conventional ultrasonic welding processes.

Important components of the total operational costs



Advantage through efficiency. With competent industrial knowledge and experience.

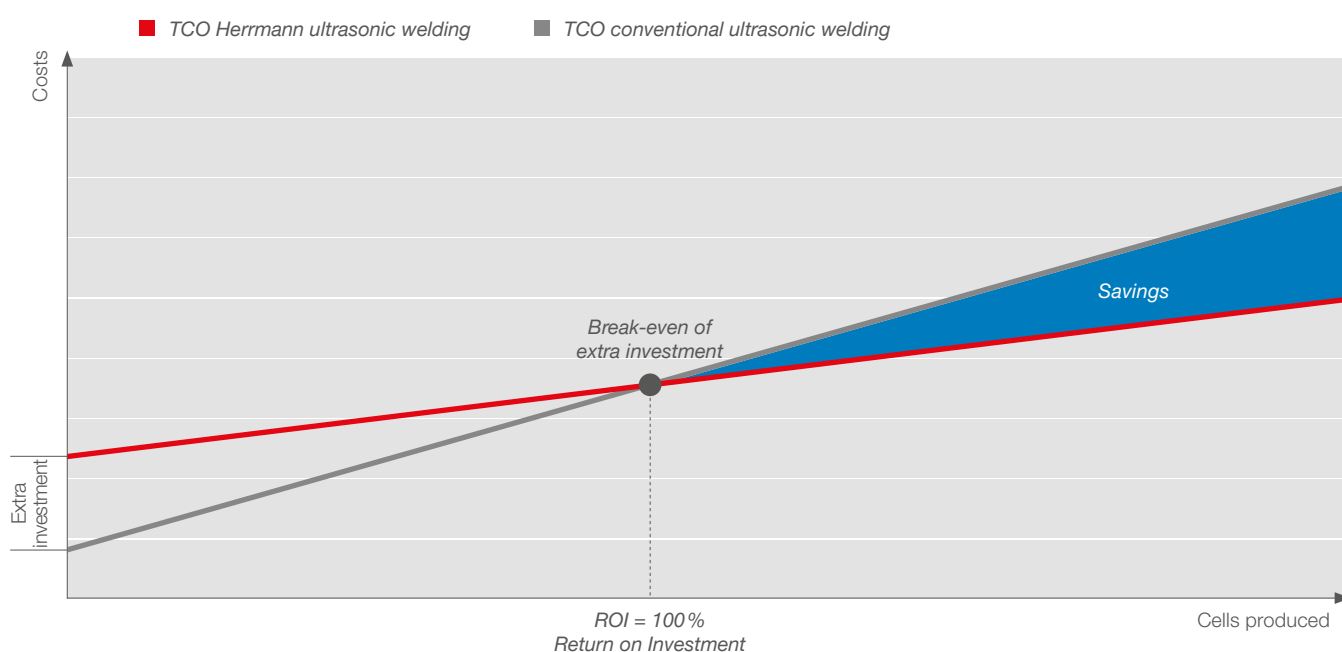
Long-term experience by Herrmann Ultraschall when it comes to joining materials ultrasonically, is an important success factor in battery development. Early introduction of Herrmann Ultraschall specialists in the product design state reduces experimental processes and costs.

- Increase of overall product quality through obtaining an optimum part design
- Reduction of repetitive and expensive modifications and optimization loops
- 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
- Consistent weld processes can be reproduced across multiple production facilities worldwide

Highly efficient. Returns on the extra investment (ROI).

The higher initial investment for the Herrmann ultrasonic system compared to conventional ultrasonic welding technology is quickly recovered through the reduction in operational costs.

Comparison of total operational costs – Total Cost of Ownership (TCO)



Environmentally friendly and energy efficient.



Ultrasonic welding technology is considered environmentally friendly. In comparison to 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 process
- Efficient use of energy due to ultrasonics not requiring preheating or stand-by cycles
- No additional auxiliary materials necessary
- Ultrasonic welding does not require a special surface preparation

BLUECOMPETENCE
Alliance Member

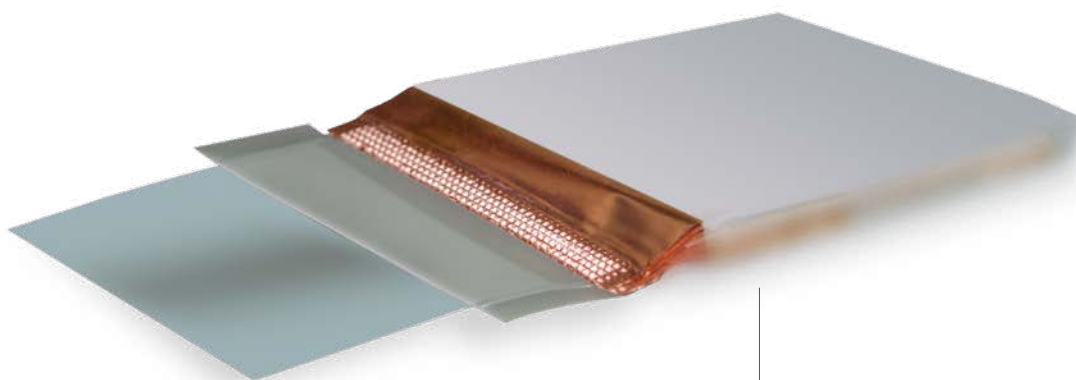
Partner of the Engineering Industry
Sustainability Initiative

Highest welding quality. For dynamic applications.



Pre-welding for LIB

A typical lithium-ion battery (LIB) uses copper foil as the anode (current collector) and aluminum as the cathode (current collector). The welding of typically 20 to 60 foils to each other requires a high level of joining technology with long time process reliability. Burrs or cracks have to be avoided completely.

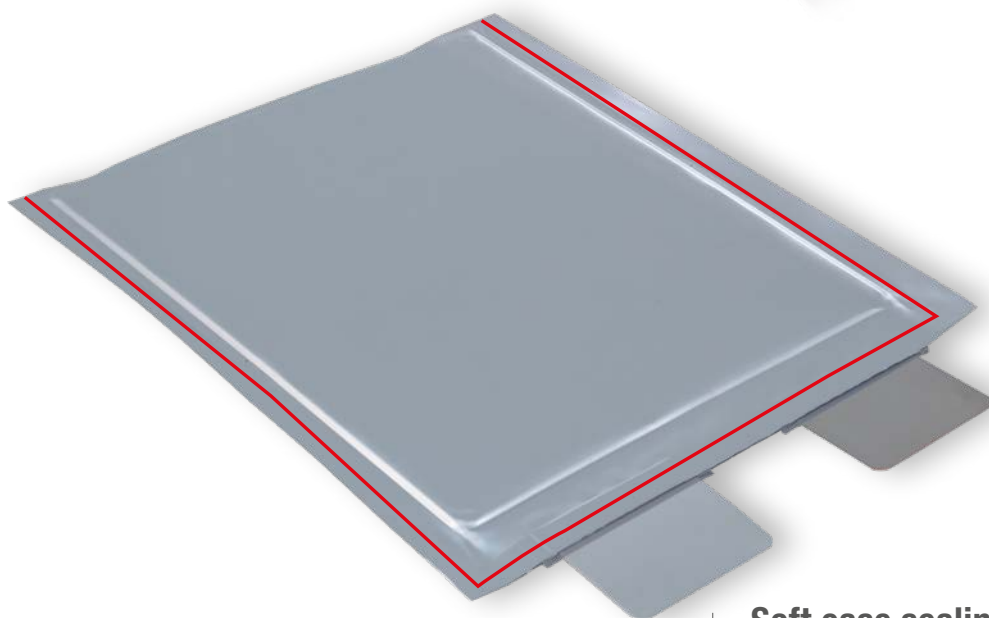


Tab-tab welding for LIB

As more and more products contain rechargeable lithium-ion batteries (LIB), the battery manufacturers are aiming for ultrasonic welding as a reliable battery assembly method. The specifications of the process demand a strong electric contact and no particles on the sealing film of the tab.

Welding of battery management systems

Rapid development of new energy storage systems increases the necessity for robust framework in modern battery systems. State-of-the-art busbars transfer up to 800 V and require a minimal contact resistance in order to prevent hot spots.



Soft case sealing for LIB

Ultrasonic welding offers an alternative to heat sealing the flexible LIB soft cases. The risk of damaging the cells is minimized by shorter cycle times and the use of cold ultrasonic welding tools as an alternative to hot sealing bars.

Innovative welding technology. Leading in speed and precision.



Herrmann intelligent Spot welder *Battery*

Herrmann intelligent Spot welder family (HiS)

HiS VARIO B

HiS VARIO B welding machines provide an appropriate platform for a wide range of battery related applications worldwide. Quality is controlled through assessment of weld process parameters and process monitoring. The design, as a flexible modular system, allows for easy and rapid integration in different types of production lines.

- Small footprint
- Process visualization and process stability
- Easy to integrate into production lines



Herrmann intelligent Spot welder *Terminal*

HiS VARIO T

HiS VARIO T ultrasonic welding systems from Herrmann Ultraschall offer added value in terms of process stability and meeting customer requirements. Graphic visualization on the VARIO controller enables the optimization of the weld process, i.e. through adjustable force profiles. This results in the highest levels of weld quality for customized weld applications. For integration in automation lines we provide modular actuator systems.

- Weld process visualization
- Quality monitoring
- Modular actuator systems

Systems and components for automation

Herrmann Ultraschall provides various actuators that offer a high level of flexibility. They can be easily adapted to individual customer automation requirements. Modular ultrasonic welding systems from Herrmann Ultraschall offer complete integration solutions for machine builders and Original Equipment Manufacturers. They are available as individual ultrasonic components or complete ultrasonic systems: Every module is a functional unit and allows easy integration and start-up.

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



Ultrasonic welding systems

Continuous support from the beginning.

ULTRASONIC ENGINEERING.

The expert teams at Herrmann Ultraschall 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.



Ultrasonic laboratory

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 microscopy, tensile tests, sealing tests, burst tests, high-speed cameras, and microtome cuts
- Complete documentation of the feasibility test results

Trainings and seminars

- Beginner and expert seminars
- Hands-on user training
- 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
- 3D-supported collision analysis
- FEM-assisted tool design
- Mechanical and electrical interface definition
- Guidance on integrating the weld process into the manufacturing process

Tech-Center on-site

- Customer-oriented support for feasibility analyses
- Ultrasonic laboratories are strategically located in the major metal markets worldwide
- Experienced and native-speaking application specialists

After-sales service

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



- Headquarters
- Tech-Center
- Local Sales Office

FIRST CLASS TECHNOLOGY. WORLDWIDE. 27 LOCATIONS IN 20 COUNTRIES.



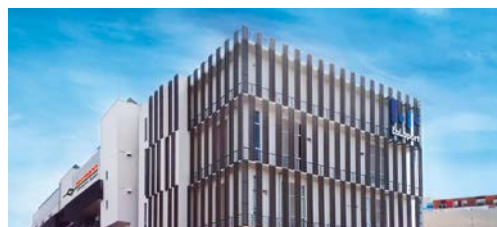
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