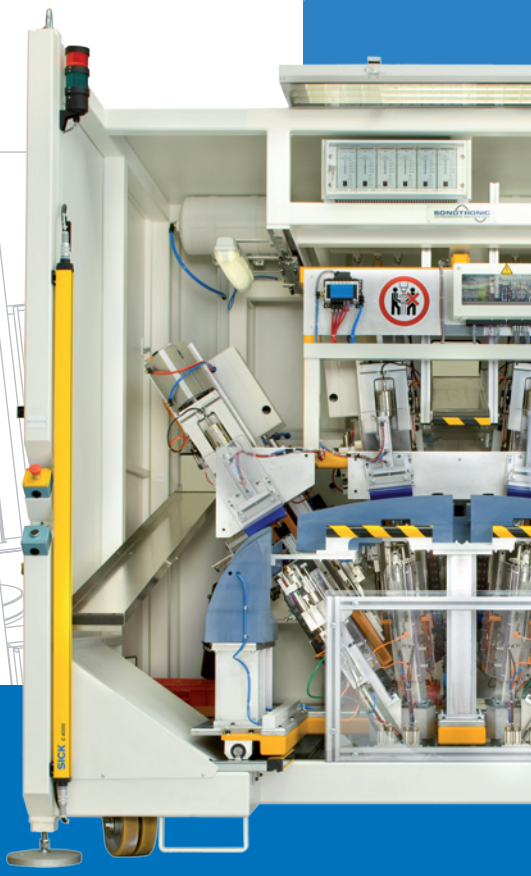
Special Machines

Ultrasonic Technology

Automotive Industry



SONOTRONIC

ULTRASONICS TECHNOLOGY

Building special machines

Development and production from one source

One of more than 1000 special machines, which we have produced in our company history

Using our extensive technical know-how and experience from well in excess of 1000 successful projects, we develop tailor-made special machines. Our special machines, based on innovative ultrasonic technology, embrace a wide range of possible applications for every industry.

"Tailor-made special machines to customer requirements."

Project planning

When planning new production lines for series production and when expanding existing production, we will assist you with advice. We will examine, on your behalf, the feasibility of your projects using our technologies and will find perfect solutions.

Applications

In the automotive industry the applications range from the ultrasonic welding machine for bonding filter fleece through to robotic systems for the flexible ultrasonic stamping of bumpers. We also solve the problems of cutting, riveting or embossing thermoplastics using ultrasound. If the task demands it, we include additional devices, such as transport or adhesive units, in order to automate processes and combine process jobs.

Simultaneous Engineering

Within product development, we use the tools of "Simultaneous Engineering". This shortens not only the development and design times but also reduces component and machine construction costs.

From idea to concept

From the idea through the concept and definition of the target, our design teams, in direct co-operation with the customers, analyse the specific application functions of the special machines. Performance calculations and knowledge of the application technology result in initial technical drafts, which mature to become finished machine designs with the help of 3D-CAD and FEM optimisation.

From prototypes to production

Following careful production of the technical documentation, work starts on building the prototypes, followed by the test phase. At this stage we communicate more closely with our customers and implement specific technical adjustments until release for production is finally given.

Simultaneous tooling design

As part of component design, we provide parallel support to our customers with CAD tooling design. At the same time as the injection moulding is designed, we develop the tools for the special machines by working directly with the customer.

Reliable products

The SONOTRONIC special machines impress by their quality and functionality. Our customers are provided with ready-to-use, reliable, tested products of the latest state of the art. We design and manufacture every special machine with extreme care and precision. This allows our customers to benefit from our many years of experience in building special machines, from our outstanding technical know-how and our feel for the optimum solution.

"Our claim: Maximum care and precision."

View of our production

Machine concepts

Customer-specific designs based on ultrasonic technology

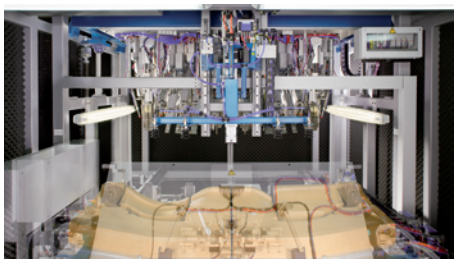
Customer-specific designs

The design of customized machines is governed by the work process, degree of automation and application. On request, we shall design our special machines and sub-assemblies in such a way that they can be incorporated without problem into the existing production lines or machine concepts. We optimise the various parameters of our special machines, as follows:

- Work processes
- Process times
- Safety
- Flexibility
- User-friendliness
- Quality of applications
- Useful life of the machines and tools

Machine concepts

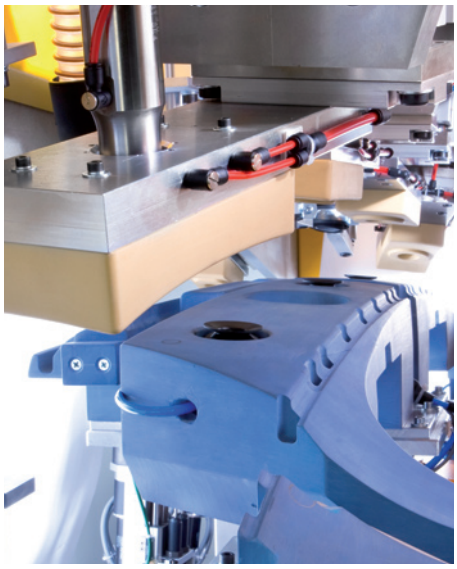
From simple ultrasonic punching machines through to highly complex special designs, we exhaust all possibilities in order to find the optimum machine solution for customer-specific applications. We adjust the special machines to the requirements of the production lines and quality standards of our customers. If the workpieces allow, we combine several working processes, by developing machines with rotary tables, swing frames or sliding tables. The most common machine concepts for our customers in the automotive industry include:



Machine concept with swing frame

"As a specialist in building special machines, we find the optimum solutions."

- Bridge type machines
  Applications with one working station
- Sliding table machines
  for one or more workrooms and one free insertion area
- Rotary transfer machines
  particularly short processing times by implementing several workstations and parallel execution of several process stages
- Cassette machines
  Change concept using tool cassettes to produce smaller runs of different designs
- Robot systems
  Flexibility in production using the latest robot technology in conjunction with highly developed ultrasonic devices



Ultrasonic units for punching parking sensor apertures

Sonotrode for welding parking sensor holders

Ultrasonic units for riveting airbag covers

Continuous development

Our special machines incorporate high-quality ultrasonic technology of 20 kHz or 35 kHz. We are continuously developing the technology in order to optimise existing ultrasonic applications and to find new ones. With numerous patents, we are the leaders in the ultrasonic industry.

System advantages with ultrasound

Because of its system advantages compared with other technologies, ultrasound enables our customers to improve the quality, performance and flexibility of their plant and machinery, amongst other things.

Tool design

A deciding factor in the quality of ultrasonic applications is the design of the tools (sonotrodes). We have been developing and producing these key components since the year dot in our own tool production plant. To date, we have produced far in excess of 60,000 application-specific sonotrodes. With our exceptional know-how, we design the sonotrodes so that the ultrasound is transferred in the best possible way to the workpiece. We also pay particular attention to:

“Know-how in all areas.”

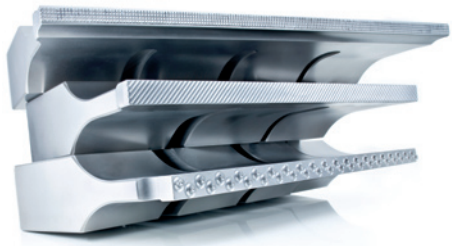
- Ideal vibration response of the sonotrodes by FEM-assisted development
- Optimising the arrangement of the weld joints
- Avoiding over or undersizing the weld joint
- Sonotrode performance

Workpiece supports

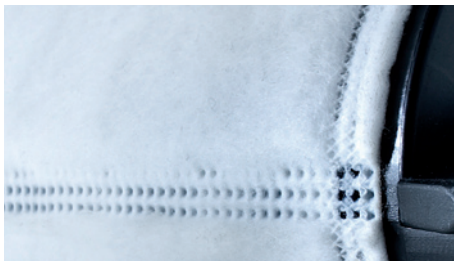
The workpiece supports ensure that the workpiece is perfectly positioned in relation to the ultrasonic devices within a special machine. Like the sonotrodes, we manufacture the supports specifically with the customer and application in mind. In our in-house pattern-making department, experienced skilled workers adjust each support precisely to the respective workpiece. During this time, we are in permanent contact with our customers.

Ultrasonic joint technology

Welding and riveting with ultrasound



Welding sonotrodes with different structures



Welding fleece onto plastic

Welding geometry and weld point

Riveting sonotrode

Riveting points of a passenger car door

Ultrasonic welding can be found everywhere where thermoplastics, polymer-compatible plastics are used and where strict demands are made of the joining system. Depending on their polymer compatibility, thermoplastic materials, such as PP, PVC, PE, PET, ABS, composite materials, fabrics, fleeces or films are suitable for welding with ultrasound.

"Exceptional process characteristics."

Process characteristics

Compared with other welding processes, ultrasonic welding is ideal if rapid process times and good process reliability are demanded. Moreover, ultrasonic welding is characterised by the quality, strength and precise reproducibility of the welds.

Positive connection

Ultrasonic riveting is ideal for producing a positive connection between thermoplastics or with non-plastics. Whilst the cycle times of ultrasonic riveting are greater than for flat welding, several rivets can be simultaneously applied with one sonotrode. Just like ultrasonic welding, riveting with ultrasound is also very efficient and at the same time saves energy. The technology is used mainly where fusion joins are not possible, where metal parts are to be inserted in a plastic housing or where the join is subsequently invisible.

Applications

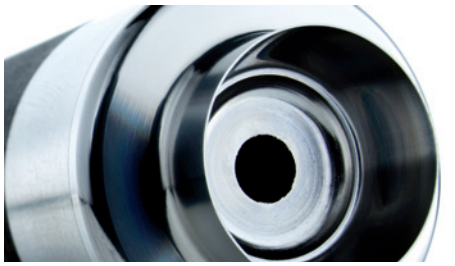
- Exterior:
  - Welding of headlamp lenses, wheelhouse or underfloor panelling
  - Welding of supports, e.g. for parking sensors, headlamp washing systems, side marker lamps, trailer couplings
- Interior:
  - Welding of textile inserts, rear parcel shelves, suspension rails in door panelling
  - Welding or riveting of instrument clusters, airbag covers or door panelling

Properties and advantages

- Very fast process times
- Excellent process control and reliability by monitoring the welding parameters
- Selective supply of energy through digital control of the welding process
- Consistent welding quality with visually perfect and strong, as well as reproducible welds
- Visually appealing weld design through individual sonotrode structure or anvil impression / embossing
- Environmentally friendly technology
- Cold welding tools
  - No machine warm-up times
  - No damage to workpieces when the machine stops
  - Rapid and simple changing of welding tools

Ultrasonic punching

Punched openings and radial embossing in premium quality



Coated punching sonotrode

The patented ultrasonic punching from SONOTRONIC makes it possible to introduce precisely defined openings of very high quality in plastic parts or textiles. In the automotive industry, ultrasonic punching is ideal for materials, such as PP, PP-EPDM, PC/ABS, PC/PBT or composite materials, such as textile /PUR, Slush/PUR/ABS.

Areas of use

As the developer of ultrasonic punching and the worldwide market leader in this area, we deploy the technology in special machines for various different applications. The automotive industry, in particular, benefits from this innovation. For example, the apertures for parking sensors or headlamp washing systems when punched with radial embossing, can be introduced directly into the already painted bumpers.

Paint drawn in during radial embossing

Radial embossing

As a result of a special sonotrode design, the radius can be embossed directly following cutting. The plastic, which is heated by ultrasound, is reformed for the purpose at the separating edge. The result is radial embossing of visually outstanding quality.

Punch quality

The punched edges of the workpieces are already welded or sealed during ultrasonic punching, in a quality that is visually clean and exceptional.

"Developed by SONOTRONIC: Ultrasonic punching."

Applications

- Exterior:
  Punching holes, e.g. in bumpers for parking sensors, headlamp washing systems, side marker lamps or trailer couplings

Punching composite materials (Slush/PUR/ABS)

- Interior:
  Punching holes for draught stops, door openers, window winders, entrance lamps and navigation modules

Characteristics and advantages

- Process benefits resemble those of ultrasonic welding
- Reduced punching force as a result of using an ultrasound-assisted punch
- No stress whitening or fluff creation on the punched surface
- Edges welded during punching
- Decoupled, constant radial embossing irrespective of material thickness
- Visually clean punching of painted and unpainted plastics
- No subsequent change in punched openings as a result of punching already painted plastics

Quality assurance

Special ultrasonic machines in the automotive industry

In order consistently to satisfy our customers' requirements, we set store by continuous quality and environmental management systems according to the tried and tested standards DIN EN ISO 9001 and DIN EN ISO 14001. Together with our team of experienced staff and motivated up-and-coming employees, we guarantee that these standards are implemented.

Production sites

We produce our special machines mainly at our company headquarters in Karlsbad (Germany). For the Spanish and American markets we also manufacture at our branches in Barcelona (Spain) and Brighton (USA) respectively. With our agents in China and South Africa, we have further production sites for the respective market.

„"What sets us apart? – More than 1,000 successful projects and customer satisfaction."

Automotive industry

Countless, well-known customers from Germany and abroad put their trust in the quality of our special machines. In almost every vehicle on the road, there is a little bit of ultrasound. Both inside and outside, there are numerous applications for ultrasonic technologies. The high quality of ultrasonic technology, in particular, has won over our customers in the automotive industry.

Customer care

From the first contact through project discussions, application trials through to provisional acceptance, machine commissioning, maintenance and service, with SONOTRONIC you are in the best hands.

SONOTRONIC

Linked with success.

Since the company was established in 1974, SONOTRONIC has successfully designed and produced systems and components for joining plastics, based on ultrasonic, heating element and laser technology. Over and above this, we use the advantages of these forward-looking technologies to find optimum solutions for other applications as well.

With a powerful team of qualified employees, we implement new ideas reliability and consistently. In so doing, we work closely with universities, research institutions, institutes and associations.

Today, our products are used in many different areas, i.e.:

- Automotive industry
- Packaging industry
- Food industry
- Textile industry
- Environmental technology
- White goods industry
- Electronic and electrical engineering
- Medical technology
- Special applications

Through our branches and partners, we are internationally represented and offer a worldwide service.

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