

Ultrasonic technology for intelligent packaging solutions

Economic, ecological and eco-friendly

PLASTIC WELDING

METAL WELDING

CUTTING

CLEANING

SIEVING



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Modern filling systems for beverage packaging operate with capacities of tens of thousands of packages per hour. This places high demands on the cycle times of all processes, including packaging. Sealing methods that use ultrasonic technology have proven their value here in multiple ways: Beverage cartons, stand-up bags and tubular bags, as well as coffee capsules can not only be sealed quickly and tightly but also gently without damaging the product. At the same time, the process is inexpensive and environmentally friendly, as it does not require any adhesives or other additives. The process is accurately reproducible, can be easily monitored and the productivity of the entire plant increases.

Today, beverage, sauce and paste packaging (Fig. 1) should not only be sealed and easy to handle, but also visually appealing and, above all, environmentally friendly. Most cartons are therefore now made entirely, or at least partially, from renewable raw materials. This is a trend that will gain in importance in the future, and one that puts us as consumers under an obligation. However, new materials that are entering the market in this context pose significant challenges for conventional sealing technologies. It is not possible, for example, to splice mono films (PP, PE) without



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01 Beverage, sauce and paste cartons can be sealed reliably and economically with ultrasonic technology.

02 Sealed bottom seam after filling

an additional protective layer (welding cloth). This is where ultrasonic sealing can show its advantages. The printed material is protected and the process itself is very environmentally friendly because it requires significantly less energy. The absence of solvents or elaborately applied adhesive layers also has an immediate effect on the footprint of the system and the production of the packaging.

How sealing with ultrasonic technology works

When sealing with ultrasonic technology, a generator generates a high-frequency alternating current in the ultrasonic range, which is converted into mechanical ultrasonic vibrations in an electromechanical converter. By using a sonotrode as a sealing tool, the vibrations are forcefully introduced into the components to be joined. The process thus generates the sealing heat from inside the packaging material. Strong bonded joints, as well as peelable bonded joints with individual sealed seam geometries if required, can be produced with this method without exposing either the product or its environment to high thermal stress. There are no warm-up times and the sonotrode remains practically cold. Heat does not alter the filler material, which is particularly relevant for groceries. In addition, the barrier properties of the packaging are not impaired.

However, the sealed weld is not only tight, but also reduces the amount of packaging material required due to the narrow sealing zone. In the case of salad packaging, for example, which is produced using the tubular bag method, this can save around 50% of the material between the bags. The ultrasonic vibration also cleans the sealing area of possible impurities, while any residual product is reliably forced out of the seam. Even sealing through liquids is no problem. In this case, another advantage comes into play: Ultrasonics can also be used for cutting, which means that stamping and sealing are possible in a single work step.

Energy-efficient, food-compliant and reproducible

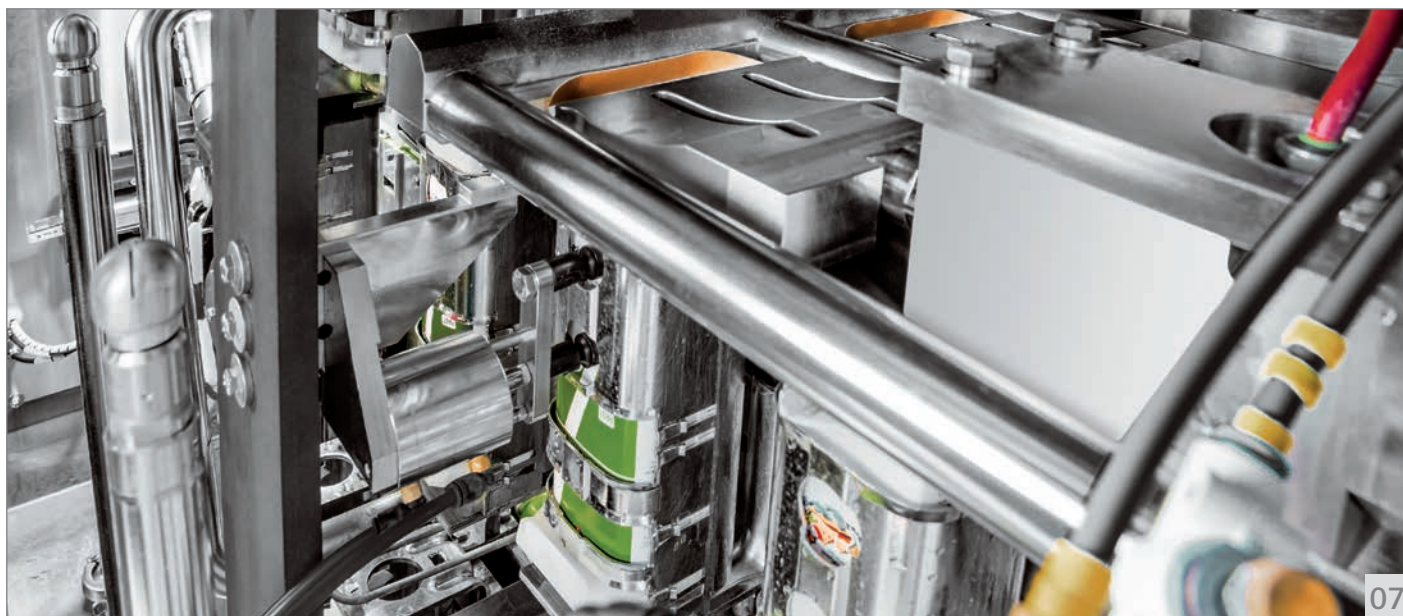
The short sealing times and high level of efficiency also distinguish ultrasonic technology as an energy-efficient joining method, which not only allows the sides or bottom seams (Fig. 2) of filled beverage packages to be sealed tightly and reliably, but also the practical quick pour spouts (Fig. 3) to be joined securely. The sonotrodes used here are made of a food-compliant, FDA-certified titanium alloy and are available in a wide variety of versions (Fig. 4). If necessary, a quick tool change is possible. The sonotrodes require little maintenance; maintenance intervals can be optimized and service costs are reduced.

The converters (Fig. 5) are also available for different application requirements in different frequencies, power classes and hygiene requirements (IP classes). Ultrasonic specialist Telsonic also has a particularly compact, patented sealing tool in its range that can be easily installed even where installation space is limited. Since the converter function has been integrated into the sonotrode here, the space requirement is reduced by around half.

The modular ultrasonic components are designed for integration into production plants and meet all of the requirements to rise to the conceptual challenges of Industry 4.0. Straightforward mechanical and electrical integration into all systems for industrial production is guaranteed, as is comprehensive quality and process monitoring. The high-speed ultrasonic generators (Fig. 6) can be controlled in a cost-effective manner via all commercially available fieldbus systems. They are compact and offer constant power output and process control through definable quality windows.



- 03 Resealable closures are welded on via ultrasonics
- 04 Sonotrodes and sealing systems for a wide variety of applications
- 05 Linear and torsional ultrasonic converters
- 06 MAG High-Speed Ultrasonic Generators



The right solution for every task

Since no two applications are the same, Telsonic offers the torsional welding technology SONIQTWIST® in addition to longitudinal welding, e.g. when different materials need to be joined together. Thanks to its many years of experience, the ultrasonic specialist can thus offer the right solution for every packaging task, e.g. in terms of economic efficiency and process speed. All systems have a modular design and can be easily integrated into the most diverse production lines via digital interfaces. Fig. 7 shows a practical example:

Due to the high production capacity of several thousand packages per line and hour, the two-lane filling system features two sealing systems that operate independently of each other. The bottom seam of the beverage cartons is tightly sealed with a titanium sonotrode. To meet cleaning and hygiene requirements, the converter housings are made from corrosion-resistant and acid-resistant stainless steel and are compliant with protection class IP67. The ultrasonic generators occupy minimum space inside a control cabinet. Machine control monitors and controls the welding process.

by Carolin Reinbold, Key Account Manager, TELSONIC AG (Switzerland), and Ellen-Christine Reiff, Stutensee editorial office



07 The bottom seam of the beverage cartons is tightly sealed with a titanium sonotrode

08 Carolin Reinbold, Key Account Manager, TELSONIC AG, Switzerland