

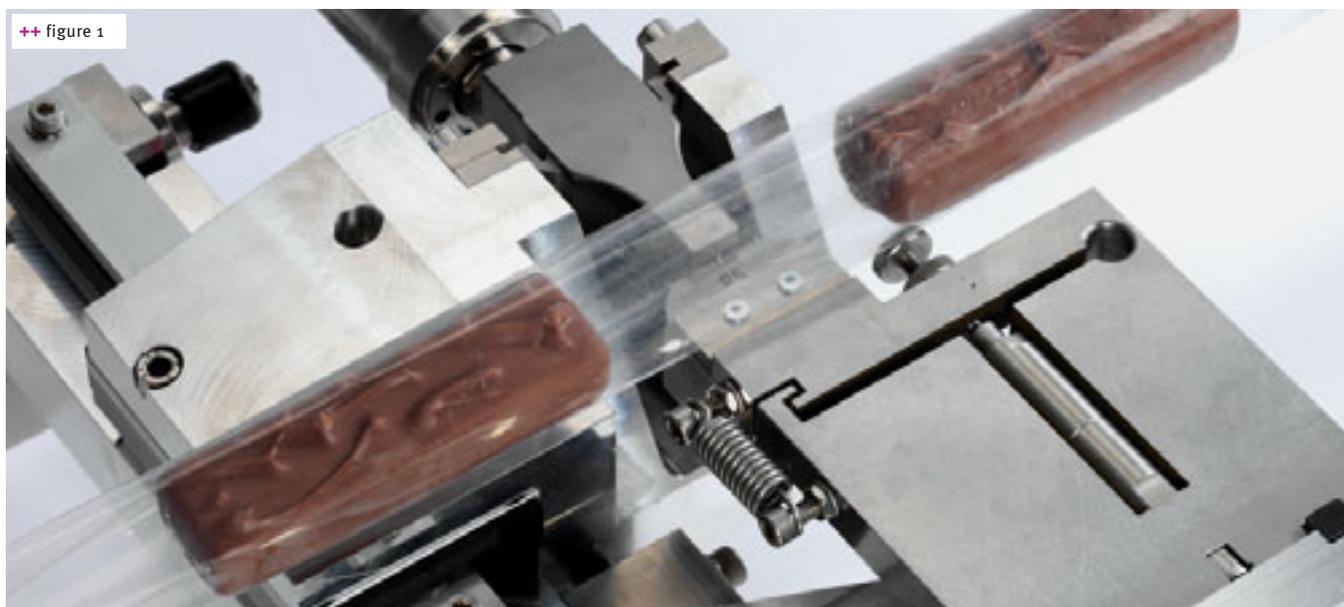
# Full of verve for easy cutting

AT ANUGA FOODTEC, THE HERRMANN ULTRASCHALLTECHNIK FROM KARLSBAD, GERMANY, PRESENTED A HORIZONTAL ULTRASONIC CUTTER WITH BLADES THAT HAVE A THICKNESS OF LESS THAN 2 MM



+ Impressive equipment, presented at the stand of Döinghaus Maschinenbau GmbH during Anuga Foodtec, stirred up the interest of the representatives from the baking industry. Underneath a swivable cupola, Döinghaus, long term suppliers of cutting machines for the baking industry and Herrmann Ultraschalltechnik, demonstrated a new development: an ultrasonic circular knife that can be used horizontally and vertically. The knife is only 2 mm

thick and allows for the cutting of products that are otherwise difficult to cut with the traditional spade shaped knives commonly used in ultrasonic cutting. Due to the design of the sonotrode, larger spade like knives are thicker and would push the product apart. At the exhibition, Döinghaus and Herrmann demonstrated the benefits of their innovation using the example of bread rolls that were cut partly or completely.



++ figure 1  
Horizontal cutter

++ figure 2  
Ultrasonic sealing of chocolate bars packs

++ figure 3  
Vertical cutter

++ figure 4  
Vertical cutter



The circular blade made from stainless steel has a diameter of 250 mm. It oscillates with an amplitude of 32 µm. The patented round sonotrode was especially developed for the circular blade. It produces transversal waves. According to Markus Labruier, division sales manager at Herrmann, cutting tests in practical application using hamburger buns have shown that the circular knives produce low wear and deliver clean cuts with high precision. Compared to a knife with a serrated blade, the cutting edges are straighter and significantly fewer crumbs are produced. The diameter of the circular blade presented is not the end of the line. According to Labruier, larger and smaller diameters are planned in the future so that a large range of different products can be cut with such a knife.

Herrmann Ultraschalltechnik GmbH & Co. KG was founded in 1961 by Walter Herrmann who originally used ultrasonic technology for cleaning and later for the fusing of plastic ▶



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materials, mainly in the automotive industry. Today, the family company, now managed by son Thomas Herrmann, is one of the global players in ultrasonic fusing machines for plastic materials and non-woven sheets, for ultrasonic sealing of packagings as well as for ultrasonic cutting.

In the food industry, the ultrasonic fusing of stand-up pouches, tubular bags, blister packs, cups, trays, tubes and cardboard boxes has been well established worldwide. One reason is that the sealing systems do not only produce bonds with a defined firmness but they also replace contaminating material that is possibly present in the seam. This reduces the rate of failures due to leakages significantly. For two years, the development engineers at Herrmann have focused on ultrasonic cutting technology. Up to now, the company has supplied spade type blades made from titanium. Soft or

elastic materials can be cut vertically with these, even if the product tends to stick to the blade or crumble during the cutting process. No matter whether it is cream gâteau or macaroons, ultrasonic blades provide for a cleaner cut. The blades themselves stay much cleaner than serrated blades or guillotines where product residues have to be removed frequently.

The Herrmann company employs 220 people worldwide. Its annual turnover amounts to 40m Euros. Besides the production in German Karlsbad, Herrmann has two subsidiaries in Chicago, USA and Hangzhou, China. Decades of experience in converter and generator technology and expert knowledge in sonotrode geometries, reflected in many patents, have made this company, with a sales volume in the medium range, into a real global player. +++

## Ultrasonic technology

Sound is a mechanical longitudinal wave which oscillates in the direction of travel and can spread in elastic media; these include gases, liquids and a large number of solid substances. The frequency of the sound is measured in hertz and is defined as number of cycles per second. Sound waves that can be perceived by the human ear have a frequency between 16 and 20 kHz while the ultrasonic frequency is between 16 kHz and one giga hertz.

Bats use ultrasonic waves for orientation, dolphins use them for communication and even humans have discovered the potential of ultrasound. It is used in ships for sound navigation and ranging; in medicine for diagnosis

(sonography), and in the industry for many different applications. In the food industry, ultrasound is used mainly in three fields:

a) Ultrasonic cleaning always takes place in liquids. The sound waves periodically compress and decompress the cleaning fluids. With high intensity, tiny cavitations bubbles are formed. The bubbles collapse near the dirty surface and remove the dirt that has been pre-dissolved by the cleaning liquid.

b) The fusing of plastic materials with ultrasonic waves belongs to the field of welding processes. The high frequency vibrations are transferred onto the materials to be combined under high pressure. The originating frictional heat produces a micro-melt which results in fusing on a molecular level.

c) For the cutting of food, a converter transforms a high frequency signal into a mechanical oscillation.

The converter consists of piezo ceramic disks with a defined pre-tensioned crystal structure. With alternating voltage, it can induce vibrations which can be controlled via amplitude and frequency. For uniform performance and reduced wear, the actual tool, a sonotrode, must be optimized according to the individual customer specifications. The design, dimensioning and construction of the individual parts are dependent on the know-how of the manufacturer. For example, the converter must have been subjected to a certain ageing process in order to produce a consistent electric polarization. For that, converters are artificially "incubated" to speed up the ageing process. +++

