

High Productivity Thanks to Ultrasonic Riveting

After opening, beverage cans can be closed again using a special seal insert on the underside of the lid



ASTRID HERRMANN

Xolution GmbH, Munich, Germany, has developed a reclosable plastic mechanism for beverage cans that reflects the consumers' wishes for more convenience. The lid is already on the market in Switzerland, Brazil and Russia. The plastic lid mechanism is the result of a long development process. Herrmann Ultraschalltechnik GmbH & Co. KG, Karlsbad, Germany, supplied the ultrasonic components for joining the plastic parts.

The new can lid has a slide with tamper-evident closure. This gives the consumer the assurance the can has not been previously opened. After opening, the can can be closed tightly again thanks to a special seal insert on the underside of the lid. In market studies, consumers reacted particularly positively to the possibility of taking the can with them wherever they go, and of being able to check the amount drunk.

The can is claimed to be able to maintain an internal pressure of 7 bar in unopened state, and of at least 4 bar after opening. This means that even carbonated beverages can be stored longer. The closure is a further development of the widespread stay-on tab closure. As the

closure is made of plastic, it feels new and pleasant on the lips when drinking. The mechanism allows air to enter the inside of the can during drinking, thus ensuring a good flow of the liquid (Fig. 1).

Ultrasound as Fast Joining Method

In order to be able to produce the opening mechanism cost-effectively, it has to be produced in large quantities. A fast and precise technique therefore had to be found for joining the plastic slide parts through the aluminum lid. During ultrasonic welding, the molecules are heated extremely quickly by the ultrasonic vibrations and fuse. A heating-up phase is not necessary, and the cooling time of the parts is shorter than with all other thermal joining processes – and that shortens the cycle time. The process times, including holding times, are often under half a second. A further advantage of ultrasonic welding is the precision of the process control via the ultrasonic generator. The energy for producing the melt can be precisely defined and supplied – temporally and locally. In this way, the four small pin domes are quickly riveted leak-tight in the first process step (Fig. 2). The tamper-evident closure is then riveted on in the second process step. The unavoidable but slight heating of the welding tool with high cycle rates can be monitored and compensated via the generator. Before be-

Reclosable. A newly developed plastic lid mechanism allows opened beverage cans to be reclosed. Ultrasonic technology is used to join the plastic parts together.

ing placed on the market, the speed of the production environment was simulated in the ultrasonic laboratory, and the cy- →

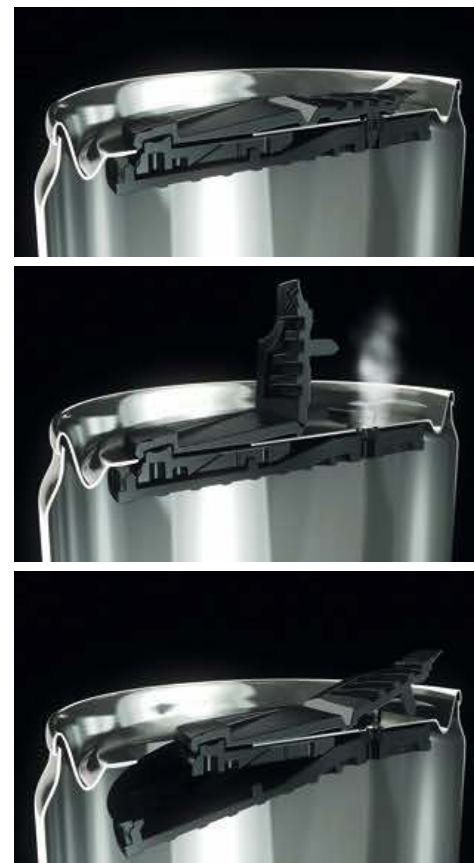


Fig. 1. The reclosable can is opened in three steps: Top: Open the tamper-evident closure, middle: Air the can, bottom: Open the slide

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Fig. 2. The four small pin domes are quickly riveted leak-tight in the first process step. Left: inner and outer slide before ultrasonic riveting, right: riveted parts

? Three Questions to ...



Marc von Rettberg, CEO Xolution

... Marc von Rettberg, CEO of Xolution GmbH, Munich, that began in 2003 as start-up and specialized in the development of innovative beverage packagings.

Kunststoffe: How do you come to develop such a project?

Marc von Rettberg: Before I came to Xolution, I was responsible for a large budget as VP Administration and Sales at Optipack GmbH and was able to gain both technical and marketing experience in the packaging industry. Xolution was a small company, but a big challenge: The business idea fascinated me, in particular the “From Lab to Fab” slogan. I saw line drawings of a fascinating product and started dreaming of turning this product into reality and developing it to market maturity.

Kunststoffe: How did you proceed?

von Rettberg: We started first of all with intensive and expensive market studies in Europe, America and Asia. The results showed that in a globalized world, it would be the young and mobile generation that would welcome this can, but that the best-agers would also be grateful if a product were easier and lighter to handle. At the beginning of the project planning, our team was faced with the following questions: What competing products are there? How well does the customer accept these? How do we optimize our production costs? And how do we market the cannability of the new lid? Added to that was the complete internal organization: When I started at Xolution, we were just a handful of people. We expanded the R&D team and recruited a production manager and a business development manager. Then we needed dependable partner companies such as Alpla, SIM, z-moulds and Herrmann Ultraschall.

Kunststoffe: There are already reclosable lids – how do you see your product on the market?

von Rettberg: We have in particular two major American companies as “friendly competitors”, but the subbase of our development is not as high as that of the other solutions. With a height of only 9 mm and the ability to be stacked symmetrically, our lid can be used particularly easily in existing canning lines. Our basis is the proven B64 shell. From the point of view of costs, our aim is that the consumer should not have to pay more than 10 % extra. We haven’t quite achieved that yet, because that predominantly means production volume. From our initial experience on the market and the inquiries we are received, however, we consider our chances very positively.

cle rate and clearance-free quality of the welded rivet domes – suitable for high internal pressure with carbon dioxide – were demonstrated.

Xolution has done a great deal of groundwork in its own research & development center in adapting the production process for a completely new product. An extended workbench was then set up with and at the packaging company of Alpla Werke Alwin Lehner GmbH & Co KG in Hard, Austria. There the plastic parts are injection molded with a cube mold. The complete lid is then assembled and undergoes a stringent test program, including a low-pressure test, a high-pressure test and a 100 % leak test. Together with Alpla, Xolution has installed capacities for a mid-double-digit million production per year.

Processing on Existing Canning Lines

The canners can process the preassembled lids in their existing canning lines – at speeds of up to 1,500 cans per minute. This means that no major investments in machinery are necessary. Retooling may be necessary only for the unpacking of the lids, because less lids are delivered per sleeve. The can is already used in practice in several countries. The energy drink “ok.-” from the Valora Group is available in the reclosable 500 ml can in Switzerland. The lid is also on the market in Brazil with the beverage “Vulcano”. In Russia, too, the energy drink “E-ON” has been available with the reclosable lid since February 2014. ■

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