Clamping system and laser welding in Weil's Ecostar

A novel answer to demanding legislation

New regulations relating to packaging in the EU are intended to reduce waste, improve recyclability and establish uniform rules, but the impact could be significant for metal packaging. ***Florian Weil*** *has a novel answer*

At the Metpack trade show in Germany earlier this year Florian Weil offered a conference presentation that explored the use of alternative welding technology in the canmaking process.

It was notable because the company of which he is chief executive, Weil Technology GmbH, has long connections with the metal packaging industry, having been established by Florian's father Wolfgang in 1987 to provide quality assurance systems.

Since then the company has expanded into many other sectors, one of which is processes for assembling large components from steel sheet such as chimneys using laser welding.

Florian Weil, who succeeded his father in 2025 as chief executive, was at Metpack to show how the process could have applications in metal packaging.

Describing the potential impact of the new EU regulations relating to packaging, he said: "The resulting increase in requirements for packaging for chemically demanding, reactive or high-quality contents presents manufacturers with new challenges.

"This is because conventional tinplate and aluminium cans use internal coatings, some of which contain BPA, PFAS or other substances that are increasingly regarded as posing risks to consumers, and are being regulated by authorities such as the EU.

"Alternative technologies and materials are therefore necessary for the manufacture of metal cans and drums used for drinks, foods and other demanding products."

Reliability

But why change the process of welding three-piece tinplate cans, one that has been developed over nearly six decades? The wire-mash process precisely holds a cylindrical can body so that there is a tiny overlap at the join, which is resistance welded between rollers that help feed the can through the welder. To prevent corrosion build up on the rollers, sacrificial copper wire is fed through their rims. The system is well-established, reliable and fast enough to produce up to 1,200 cans per minute in the smaller sizes in gauges as low as 0.10mm.

But there are applications, as Weil says, where a steel that resists corrosion without the need for applied coatings,

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Self-cooling beer keg

is a better choice. Weil Technology has the experience of making containers for demanding products.

"Stainless steel offers a clear advantage," says Weil, "because it requires no protective coatings, having by its nature a corrosion resistant surface."

He goes on: "The metal however needs a special technique for manufacturing cylinders that differs from the conventional wire-mash welding process that has been used for many years to make tinplate containers.

"Laser welding has been used for joining thin-wall stainless steel containers, and there are applications in which laser-welded stainless steel cans provide a high-performance, sustainable and future-proof route to the production of premium, classically-styled cans.

"An excellent example of a laser-welded stainless steel container in the beverage industry is the beer keg.

"A metal keg can withstand pressure loads of up to 10 bar and operates safely at up to 7 bar when dispensing. By comparison, plastic kegs can usually only withstand a maximum of 6 bar, and often only 3.5 bar when dispensing. This leads to extreme foaming at high temperatures, to the extent that the keg has to be cooled again before dispensing.

"Stainless steel offers a natural, PFAS-free barrier with high chemical inertness, is tasteless, sensorily neutral and does not react with acidic, alcoholic or thermally stressed fillings. So it is suitable for all different types of fillings – most suitable are contents with special requirements like certain pressure or corrosion resistances.

"Laser-welded stainless steel containers offer high corrosion resistance, are completely gas- and liquid-tight, durable and robust – without additional coating. The combination of the properties of stainless steel with the advantages of laser welding make these containers an ideal solution for reusable, refillable and premium packaging with complete recyclability."

Automation and control

Florian Weil went on to describe the use of laser welding in a production environment.

"Laser welding is a highly automated and controlled welding process that starts from precisely defined welding edges and ends with a welding process that has the lowest heat input, comprehensive shielding gas, and operates with the highest repeatability and stability during operation.

"This grants the longest lifetime of the content in such kinds of stainless steel containers. With minimal heat input we indicate that we only melt the material very close to the edge. Besides the weld seam, there is no further heat in the part itself. So, unlike in other welding processes where parts are deformed due to the high heat input.

"Weil Technology has established a manufacturing process for thin-walled stainless steel cans that enables precision, flexibility and short cycle times. Using proven and innovative equipment, laser-welded containers, cans and drums with a sheet thickness of 0.3 to 0.5mm are manufactured with a high degree of flexibility and the shortest possible cycle times.

"Weil Technology's Flexistar system, for example, is used to manufacture all kinds of metal packaging – drums, cans of all sizes, boxes, etc. Even when the packaging is not round in shape, where the base is often a metal tube."

Some of the processes, such as cutting and forming, will be familiar to canmakers using wire-mash welders. Then things change, says Weil. The sheet metal is cut to size from the coil, roll-formed and fed to the laser welder. The longitudinal seam is welded by the laser with a speed of more than 20 metres per minute, so that each container takes about a second.

Weil continues: "The focus is on high requirements for the can. Laser welding without filler material guarantees a visually striking seam."

Weldback technology

Weil Technology calls the technology Weldback, which "enables smooth, high-quality seams that are stable, gas- and liquid-tight, and ideal for hygienically demanding and aggressive filling materials and, if needed, under higher bar pressure".

Weil explains: "What is unique about the Weldback technology is that at the beginning and end of the tube we weld back once again to stabilise the seam. The seam is made by butt laser welding,

Steel containers with welded seams

A steel box with a welded seam

without filler-wire.

"The strength of the weld seam exceeds the strength of the base material over the entire length of the seam, especially at the beginning and end of the seam, where subsequent forming typically causes the highest stress.

"Subsequent forming into different geometric shapes, for example oval or square, is often one of the next production steps. In addition, after the shell has been manufactured, bottoms and tops can be attached using the same technology with orbital welding.

"Employing state-of-the-art sensor technology, positioning tasks, weld pool monitoring and seam measurement can be performed during the welding process. This means that the processes can be monitored and controlled online. The laser welding process is contactless and wear-free, ensuring that the finished products are manufactured to a reproducible quality."

Quality and sustainability

"Due to their high surface quality and robust seams, laser-welded stainless steel cans are extremely hygienic. An appropriate fixture and shield-gas concept ensures high corrosion resistance and gas and liquid tightness of the weld seam. The shielding gas used is chosen according to the material that fits best for the customer. Usually this is argon, but nitrogen or helium are also used," Weil explains.

"The containers, which have high impact, scratch and pressure resistance, can be stored for long periods and are ideal for reusable, refillable and premium applications. A laser-welded stainless steel container is ideal for brands and products that focus on quality and sustainability."

One specific application for laser welding is for stainless-steel drums, which are subject to high standards in safety and quality.

Says Weil: "Stainless-steel drums also offer advantages in terms of sustainability: the EU Packaging Regulation PPWR requires plastic packaging to contain a minimum proportion of recycled material. Metal packaging is exempt from this requirement. Stainless steel achieves a recycling rate of more than 90% and is completely recycled in the same material cycle, with no loss of material property. This means no additional costs, no loss of quality, no complex changes, but rather a sustainable circular economy that does not harm the environment.

"In addition, stainless steel drums are impact-resistant and dimensionally stable. Laser-welded stainless steel containers are therefore suitable for self-cooling drums, which have special requirements in terms of pressure and refilling."

Clearly, the use of laser-welded containers won't have an impact on the manufacturers of three-piece tinplate cans in the wider food markets. But there are products with demanding requirements or are aimed at the premium drinks sector that will benefit from the appealing appearance of stainless steel, despite the much higher cost of the tinplate.

Weil also understands that there are limits to the use of decorative inks and coatings on stainless steel. Inks applied to the flat stainless sheet do not have the same adhesive qualities during forming. This is where digital printing may provide an answer.

Weil was realistic when *The Canmaker* talked to him at Metpack: "We're not saying laser welding is the next best thing and everybody has to go to laser. It's important to understand, that there is a combination between benefit in the material itself or benefit in the weld geometry – we have a butt weld – and if there are no advantages in weld speed or a butt weld or stainless, then main resistance welding is always best in this case."

Florian Weil is managing partner of Weil Technology GmbH in Müllheim, and the second generation to lead the company as chief executive. In 2020, he joined the family business to set up the in-house development department, which brings future technologies and applications related to laser material processing to market. In 2021, he took on responsibility for the strategic development of the company as co-chief executive and headed the innovation department.

Weil Technology is one of the leading suppliers of machines and systems for sheet metal processing. Its core areas being innovative systems in laser welding and cutting, clamping technology and automation.

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