



Services

LIGHTWEIGHTING

Less is more

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The pooled expertise of pioneering injection molding technology provider Husky and proficient bottle designer and manufacturer KHS has given rise to one of the lightest PET bottles for still beverages the world over.

NON-RETURNABLE PET

PHOTOGRAPHY / ILLUSTRATION

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COVER PHOTO

Consistent concept: from preform through blown PET container to filled, labeled and capped bottle.

KHS has set an impressive new benchmark by engineering one of the world's lightest PET bottles for still beverages to date. Under the working title of Factor 101, in close cooperation with Canadian-headquartered technology equipment and services provider ↗ **Husky**, a container has been produced that uses just 5.89 grams of material to hold 591 milliliters of product – the equivalent of the 20-ounce size common in the United States.

Marketable further development

At drinktec 2017 KHS presented its ↗ **Factor 100** concept as a feasibility study that featured a PET bottle weighing approximately five grams with an already sizeable capacity of 500 milliliters. A considerable number of optimizations have now been made to the further development, as KHS packaging designer Fabian Osterhold in Hamburg explains. “With such extreme lightweighting, what’s known as the top load is especially important – a value that tells us how sturdy the bottle is from a vertical perspective. It determines whether the container can be stacked or not and survive transportation undamaged.”



↑
The predecessor Factor 100 bottle from 2017 (left) has now been successfully further developed as the Factor 101 concept.



The shoulder of the extremely light bottle has been strengthened with vertical webbing, among other features, to stabilize it.

Extremely robust lightweight

To increase stability, the shoulder design of Factor 101 has been modified and the bottle body reinforced with functional webbing. Moreover, Osterhold and his colleagues have developed a base with a pop-in effect. Here, the base pops inwards to a certain degree when a top load is applied, increasing the internal pressure and therefore the stability of the bottle.

This results in a top load of over 220 newtons – 200 newtons is a common threshold in the industry. In order to achieve this high top load of 220 newtons for a PET bottle used for still beverages, adapting just the container shape isn't enough. "The preform design also needed to be developed further," emphasizes Osterhold. This is why KHS joined forces with the experts at Husky. The company has a wealth of expertise as the world's leading equipment supplier of PET preform injection molding systems and services and has been in cooperation with KHS for many years.

“The focus is on the exact profiling of the preform made possible by KHS technology.”



Fabian Osterhold
Packaging designer at KHS

Challenging coordination

Technically speaking, the stretching factors from blank to bottle and the resulting preform dimensions are especially important here. The relation of length to wall thickness is particularly relevant to injection molding. In this context, KHS addressed the specifications and feasibilities of the stretch blow molder and bottle design, while Husky made the necessary modifications to the preform. “The focus here is on the exact profiling of the preform made possible by KHS technology,” Osterhold ascertains. “Focus lamps in the heater on our InnoPET Blomax Series V, for example, make for extremely precise temperature profiling directly under the bottle neck ring. This ensures that no material stays unstretched. In turn, this considerably reduces the amount of plastic used.”

30% less material

Compared to the standard lightweight PET container holding 500 milliliters of still water that usually weighs seven grams on the US market, the joint KHS/Husky product requires 30% less material – and can be manufactured entirely from rPET.

However, bottle geometry is just one factor. “Line compatibility in the high-capacity range of up to 90,000 bottles per hour is a key challenge,” says Osterhold. “The main issues here are conveying, labeling and the secondary packaging. In the shrink tunnel, for instance, special attention must be paid to the bottle shoulder – and the bottle naturally shouldn’t fall over during conveying.”

High-speed development

Not only the weight but also the time in which the project was implemented are possibly record-breaking, Osterhold states with satisfaction. Thanks to the great teamwork between Husky and the many KHS departments involved in the development process, the project was successfully concluded in just four months – surely a sporting achievement, laughs Osterhold.

Great interest on the market

Factor 101 was first ↗ presented live by Husky at NPE 2024 in Orlando, Florida, in May. The extreme light weight was met with great interest in the industry. “The bottle in this form is of particular relevance to contract fillers who operate under great cost pressure,” believes Osterhold. “Our prime target markets are the United States, the Middle East and South America.” The first projects are already in preparation.

AT EYE LEVEL

Intensive exchange of information

Frank Haesendonckx, director of PET Technology at KHS, and Michael Müller, director of Aftermarket PET Tooling for Husky Technologies, on the close cooperation between their two companies:

Haesendonckx: Factor 101 is an excellent example of how we're combining Husky's engineering expertise in preform manufacturing with our proficiency in bottle design and production. Our joint aim is to produce a high-quality, high-performing, lighter result than either of us could do working on our own. Or, as I like to put it: for us, one plus one is greater than two.

Müller: We see great benefit in combining our technical expertise and envisage leveraging this for future projects. Here, Factor 101 acts as a starting point for discussion of a lightweight program and optimization of current packaging systems and solutions.

Haesendonckx: We aim to combine more cost-efficient preform and bottle manufacture with improved performance – also above and beyond Factor 101.

Müller: We're joined by a common spirit and goal – namely working towards developing sustainable packaging.

Any further questions?

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