



*From left to right: Sidel's vice-president of packaging Vincent Le Guen, Raphael Clairin, vice-president of industrial base management and global resource planning, and Edouard Philippe, mayor of Le Havre*

# Open innovation

It all started with a pioneering story. In the 1960s, Paul Lesieur wanted to replace glass oil bottles with plastics ones. He recruited an inventor, Antoine Di Settembrini, who created the first plastics bottle-blowing machine in 1962 in the port district of Le Havre, France, between the canal, cows and moorhens.

Two decades later, the Société Industrielle des Emballages Légères (Sidel) bet on a new material, PET, to package the soft drinks of the Coca-Cola Company, Danone and Nestlé.

Things have moved on significantly since then, with Sidel now one of three industrial groups belonging to Tetra Laval and providing equipment and services for packaging liquids, foods, home and personal care products in PET, cans and glass.

PET has a lot going for it but, as we know, the plastics packaging industry in general currently has its challenges. According to

Celebrating its 60th anniversary in Normandy, Sidel recently opened the doors of its Octeville site to officials and journalists, keen to showcase its rPET pilot line and discuss opportunities and challenges for recycled material use.

**Dominique Huret** reports on-location

a report by the Ellen MacArthur Foundation published in 2021, the amount of rPET in PET packaging worldwide is 8 per cent. In Europe, the average is 15 per cent and is expected to reach 35 per cent by 2030.

PET collection is increasing well on the European continent and there is ever more material to recycle, says Sidel vice-president of packaging Vincent Le Guen. Demand is definitely there, often outstripping supply, he adds.

“The demand for food-grade rPET is so high that rPET is sold at higher prices than virgin PET,” he explains. “On the other hand, we need both acceptable quantity

and quality to implement improvements and increase the automation of sorting techniques. Today, there are additional challenges. The variability in the grades of rPET resin and in standardisation are still under development.”

Unreliability in the quality of recycled resin brings new constraints for blowing bottles in rPET. “We also need to acquire advanced knowledge about the recycling of PET bottles in contact with food, including the impact of additives and primary packaging materials on the blowing process. To understand how to adjust our equipment in the various cases and



**Left:** The X-Lite Still package weighs just 6.5g and stands 19.5cm tall

**Above and right:** Sidel invested upwards of €2.5 million in a pilot PET recycling line in Octeville

**Below:** Vincent Le Guen says Sidel wants to optimise procedures on how to blow rPET



## Microprocessor shortage a major concern

Calling it an “unprecedented situation in our history” in October 2022, Sidel Blowing & Services president Raphael Clairin admitted that the worldwide shortage of microprocessors was of significant concern.

“Taiwan produces 80 per cent of the world’s microprocessors. At the height of the crisis, delivery times quadrupled and this lasted for up to a year,” said Clairin. “This affects our order book and we’ve had two years of orders and 200 machines waiting for their security cards. We had to rent a special hangar.”

The situation had eased somewhat by the time of the All4Pack trade show in France at the end of November, with Sidel managers more confident, saying that delivery times had shortened. A return to normal is not expected before 2024, however.



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**Vincent Le Guen, Sidel**

with a range of input is essential,” he adds.

It is in this context of very strong demand growth and technical challenges that Sidel announced the opening of a pilot PET recycling line at its plant in Octeville, France.

“We have invested €2.5 million (\$2.56m) in this pilot line,” explains Francois-Xavier Gaillard, packaging process and feasibility manager. “The objective is for the line to recreate the entire recycling process, from bales to flakes to pellets, in order to test the compatibility of other materials added to the PET bottle with the existing recycling process, including additives and closures as well as labels, inks and glue.

“The raw material used for this pilot line will come from local sorting centres and recyclers, but also from industrial partners keen to test the equipment in our R&D centre in Octeville.”

A walk over to Sidel’s large white R&D packaging hall offers a glance behind the scenes. There are confidential booths where brand owners can conduct their feasibility and quality testing during blowing, but there is also an rPET line, which is very much in the open – in more ways than one.

“We aim at open innovation to drive the entire industry towards rPET,” explains Sophie Wattiez, Sidel’s manager of customer training. “This small pilot line is a replica ▶▶

## Octeville innovation

**S**idel's X-Lite Still package weighs just 6.5g and stands 19.5cm tall, making it what the company claims is the lightest 500ml PET bottle in the world for non-pressurised still water.

Integrating the StarLite Still base, it has been optimised by the company's engineers for the Sidel Super Combi, which comprises five process steps: preform feeding, blowing, labelling, filling/capping and cap feeding. It is compatible with rPET, provided the quality of the material is appropriate.

According to blowing tests performed under industrial conditions, X-Lite Still can contain between 25 and 50 per cent rPET, and still guarantee adequate quality and performance in the bottle.

Another innovation, the 1Skin, is Sidel's label-less bottle for beverages. According to the company, the 1-litre bottle offers a balance between product safety, performance and sustainability.

Using minimal raw material (28g for 1l size) and with a neck reduced to 3.2cm, it is made from 100 per cent rPET. Being label-free, the bottle is also free of glue, which can interfere with the recycling process.

The closure is tethered in

accordance with the July 2024 EU deadline for the tethering of caps on bottles less than 3l. A QR code is stamped on the closure to allow legal notices to be included.

Sidel/Sukano, meanwhile, is a design-for-recycling project. The collaboration with Sukano, a specialist in additives, colour masterbatches and compounds, has demonstrated that solid white, light-barrier PET bottles from recycled material are technically viable. The bottles can be recycled for bottle-to-bottle applications.

No measurable difference was found in processing conditions or blowing output while processing the 100 per cent recycled white PET material from Sukano-designed white masterbatches, even under the most challenging conditions.

Sidel packaging designers also recently developed the PressureSafe container for aerosols, which is compatible with both virgin material and rPET. The container's resistance has been validated by comprehensive Sidel tests that comply with FARG and finite element analysis protocols for containers up to 1l in size. It passes a drop test up to 1.8m and hot air burst test up to 8

bars pressure at 65 deg C for five hours. PressureSafe weighs 21g (container without valve and cap) for a personal care volume of 220ml, 150ml of which is product. The neck finish weighs 3.55g and is suitable for regular valves.

The container base design is patented. It has a specific geometry and specifications to reinforce pressure/temperature resistance using the Sidel Base OverStroke System. A shell mould is designed with an integrated cooling circuit to maintain blowing process consistency. This is the active mould base technology, which has been commercially available for about a decade.

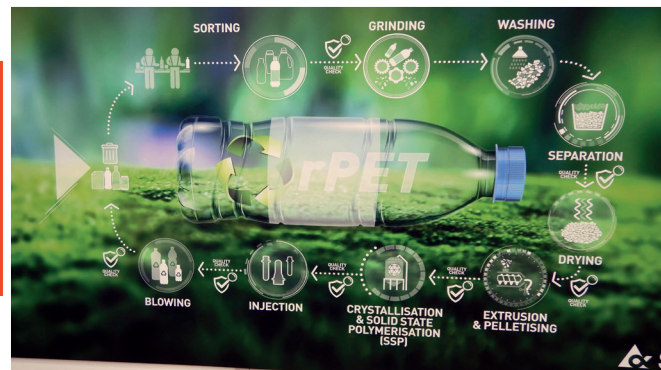
The base design bears a vault profile with a concave embossed structure. The aerosol can be blown on Sidel's SBO EvoBlow & SBO Universal machines. Its carbon footprint is said to be half that of aluminium: 645g of carbon dioxide equivalent for aluminium versus 380g for PET (for a 150ml personal care product).

"We've taken our 30 years of technical design, innovation and packaging experience and translated this into the new PressureSafe product," explains Mikael Derrien, Sidel packaging and tooling innovation manager. "It is now ready for industrialisation."



Above: Test and training expert Emmanuel Monnet

Below left and right: A walk around the Octeville facility provides a PET history and a glimpse into the present and future of rPET production



of standard equipment. At present, we are sorting manually, which gives us good control over the input. We select mainly transparent and light blue packaging to be tested, including specific innovative primary packaging materials."

The PET packaging is ground into flakes, before being washed and dried, says Gaillard. "The next phase is extrusion to produce amorphous pellets, followed by solid state polymerisation to achieve the target viscosity, he adds. "For this

small-scale line, the extrusion is carried out at a rate of 15kg per hour. Polymerisation yields 25kg per day at 0.83 intrinsic viscosity. For rPET used in still drinks bottles, a viscosity between 0.72 and 0.74 is fine, but for carbonated drinks 0.8 is needed."

The substantial Octeville site also houses a training centre, where specialists learn and explore the limits of preform blowing technologies and raw material properties, including rPET.

"The quality of the preform composition is essential. But preforms are also time and storage sensitive, and that needs to be taken into account," adds Wattiez. "And blowing rPET has additional constraints. The heating/ventilation of the preform and the distribution of the material are the two really critical points. We have to adapt and adjust our machines to that. We aim to avoid cracks and uneven material distribution at all costs. We need to address this to create the best possible



Sébastien Homont, pilot line engineer

finished bottles, and our pilot line is a lever to build deep expertise in recycled materials. This is a whole learning process for our engineers as well.”

In front of a panel of local and national representatives, Le Guen confirmed Sidel’s ambition to become a hub of information for raw material producers, recyclers, recycling regulators, and brand owners.

“With this pilot plant, we want to develop expertise on resins and optimise procedures on how to blow rPET,” he says. “In the past, we bought the resin outside and that was limiting us. Now, we will be able to do an in-depth analysis for optimised processes with various quality inputs.

“Among our customers, 90 per cent of the training they asked for is in rPET,



Sidel designs customised moulds that fit with any type of blower and blowing process

especially in France. We believe it is only the beginning. Remember, PET is the only plastic that is 100 per cent recyclable bottle-to-bottle and that the usage of rPET is already a reality today. We are continuously upgrading blow moulding equipment, to process any concentration of rPET. But then again, collection and recycling streams need to be further developed to face growing demand for rPET.” EP

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We have made the following changes to [ecoplasticsinpackaging.com](http://ecoplasticsinpackaging.com):

- Improved the categorisation of topics, processes and end-markets across the website
- Made it easier to access the topics that **YOU** want to read
- Improved the top navigation of the menu layout
- Added the latest features from the magazine content on the home page with filters

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