

No more foaming problems for Hungarian bottled water and carbonated beverages

CALM WATERS | Balf is a part of the city of Sopron, located near Hungary's border with Austria and is situated directly on the edge of the Neusiedler See National Park. This region is also known for its excellent mineral water. Here, the company PET-Pack packages the mineral water "Balfi" as well as over 60 different non-alcoholic beverages. Problems with foaming were experienced with all of these products during filling, especially with those containing sugar. In order to solve this problem, two possibilities were examined: one option was to implement a very energy-intensive cooling process, and the other, to install a cavitator manufactured by CavitatorSystems GmbH, based in Landshut, Germany.

ONE OF THE BUSINESS DIVISIONS

of PET-Pack, a holding company based in Hergiswil, Switzerland, is the production of PET preforms and caps. Recently, PET recycling has been adopted, and consequential preforms are now being produced using a percentage of recycled PET flakes.

■ PET preforms and caps

"The demand for recycled PET material from all branches of industry has become so large that the price for recycled materials has sharply increased. Additionally, processing recycled material is much more complex than working with new material. From an economic perspective, recycled PET is simply not viable!" says *Mathias Mackiewicz*, managing director for PET-Pack. He speaks German, English and various Eastern European languages fluently, is responsible for product development at PET-Pack and in charge of the procurement of new equipment in Central and Eastern Europe. Currently, the company processes approximately 5000 tons of granulated PET annually for the manufacture of bottles and caps.

■ In-house and contract packaging

From Ljubljana to Warsaw, PET preforms (for blow molding to the final bottle shape) with matching caps supplied by PET-Pack Holding can be found in numerous beverage manufacturing facilities across Central and Eastern Europe. For some time now, the company has been operating filling and packaging plants in Budapest/Visegrad as well as in Sopron/Balf. At these locations, the company brands of mineral water, "Balfi" and "Visegradi", along with more than 60 different beverages are packaged in disposable PET bottles, in 0.5 l, 1.5 l and 2 l sizes. According to Mackiewicz, "the existence of the Balfi Spring near Sopron has been documented since the 16th century. The mineral water is the best in all of Hungary, and we are filling it here at the source. We are seeing strong sales for this water."

■ The best alternative

About seven years ago, two modern filling lines for PET bottles were installed (12 000 bottles per hour for mineral water, 10 000 bottles per hour for non-alcoholic beverages).

PET-Pack preforms were blow molded and the bottles filled using conventional machines. "At the beginning, sales were slower than expected; however, we are currently supplying large wholesale chains in Hungary, Romania, the Czech Republic, Poland and Austria. Despite the fact that our filling equipment is amply dimensioned, we were not able to reach our maximum filling capacity due to the strong foaming problems experienced during filling. Generally speaking, this was a problem encountered with beverages containing sugar, but it also occurred with mineral water filled in 1.5 liter bottles," Mackiewicz explains.

One of the reasons foaming occurs during the filling of carbonated beverages, especially with those containing sugar, is the rapid change in CO₂ pressure. CO₂ is typically present in the liquid in the form of large bubbles. "We were faced with two alternatives: either to lower the rate of filling to the



M. Mackiewicz: The 'Balfi' and 'Visegradi' mineral water brands are experiencing strong growth in Eastern Europe



Mineral water and over 60 non-alcoholic refreshment beverages are filled in disposable PET bottles on two filling lines



The use of the cavitator results in smaller bubbles and a more intense flavor

extent that no foaming was taking place, or to install an energy-intensive cooling system, which in turn would have been expensive to operate. Therefore, we sought a third alternative – a quality assurance engineer from one of our concentrate suppliers brought the new technology from CavitatorSystems to our attention. We looked at the cavitator at the trade fair. After observing a cavitator in operation on-site at the Gasteiner Mineralbrunnen, we decided to purchase one!" Mackiewicz explains.

■ Cavitation

The concept of "cavitation" can be described as the formation of hollow areas in fluids as a result of a localized drop in pressure. This physical process is induced by the design of the cavitator and is used to significantly improve the mixing of gases and liquids. The CavitatorSystems GmbH in Landshut uses its patented cavitation technology to achieve the effective and economical mixing of liquid, semi-liquid and gaseous media. CavitatorSystems actively focuses on performing research and manufacturing industrial systems for mixing diverse products and substances and for food applications as well as non-food industrial applications.

If a fluid at high pressure is forced through the patented cavitator (constructed from stainless steel, with several disks mounted in various positions), cavitation bubbles are created. Shearing forces and implosions break each individual bubble into smaller bubbles, resulting in a thorough, homogeneous mixture. Cavitator mixing technology is a modern, extremely effective technology based on cavitation. Cavitator devices can be used for the following applications: mixing, emulsification, homogenization,

dispersion, dissolving and saturating fluids (mixed together or with the addition of gases) and also for the aeration of fluids.

This technology is especially suitable for applications involving beverages with a tendency to foam and can be used for the following processes: deaeration of water, carbonation of water and other beverages, or for the mixture of intermediary products such as beverage concentrates. A cavitator can be utilized for single purpose or multi-purpose applications. A total system is available as a pre-mix system with one or more cavitators along with the necessary measurement, regulating and control equipment.

■ Extreme homogenization

At PET-Pack, the CavitatorSystem AF-2x65-24 was retrofitted downstream from an existing mixer as a free-standing aggregate.

The goal was to reduce the foaming to the extent that the filling performance could be increased without prior cooling. In this case, the principle of cavitation, that is, extreme homogenization, was utilized effectively: the resulting carbon dioxide was much more finely and deeply bound in the beverage. For the beverages prone to foaming, not only has there been a general reduction in foaming, but these beverages tend to foam over less during filling. Additionally, mouth-feel has been improved and the sensory impression enhanced – both in intensity and flavor.

The complete system manufactured by CavitatorSystems in Landshut is delivered with a variable frequency pressure pump, a differential pressure gauge and a controller. Directly upstream from the cavitator, the product is raised to a pressure of more

than 10 bar in the pump. In the cavitator, the pressure is lowered to approximately 6 bar. The beverage remains at this pressure as it is transferred to the filler.

■ Keeping promises

"CavitatorSystems assured us that with this new technology, we would be able to fill mineral water at high throughput rates without foaming. They also stated that products containing sugar could likewise be filled at the same high filling rates as the mineral water. Everything they promised indeed came true. Our demands and expectations were not only fulfilled, but surpassed, and we are very satisfied with the system. The best feature of all is that the temperature does not change during filling: the product is not heated and therefore the quality of the product is not negatively affected in any way. Naturally, this is very important for us", Mathias Mackiewicz emphasizes.

B. Brosch



The Balfi Spring has been in existence since the 16th century