

Energy Saving at Higher Performance Level

CavitorSystems supplies eight complete systems for Hassia

The Hassia Group in Bad Vilbel, Germany in the State of Hesse includes six subsidiaries which produce twelve different non-alcoholic brands – mineral water, lemonade, juices and Cola. Of the eighteen bottling lines run by Germany's fourth largest beverage manufacturer (about 750 mill. litres/year) eight are pure PET lines which largely had the same problem. This was that from a certain temperature the product to be bottled foamed, irrespective of whether it was carbonated mineral water or a sweetened drink. Previously, either the line throughput had to be significantly reduced or the beverage cooled at great expense.

Now this is part of the past, because the Landshut company, CavitorSystems, has supplied eight full Cavitor systems with impressive results: on some lines up to 20% more bottling performance, the elimination of any cooling and therefore enormous cost savings for the rental of the cooling equipment as well as energy consumption.

No foaming and no underfilling

"We still have no adequate explanation of why even carbonated mineral water, once it gets warmer than 12 or 13 degrees, sometimes foams up when filled into PET bottles. With the lemonades and sweetened drinks we take it that the

sugar and fruit juices are responsible, but with mineral water we just don't know. Therefore, in the warmer months we had to either reduce the throughput of our lines or partially cool our beverages. For this task we employed large cooling systems, which consumed vast amounts of electrical power – both cost factors which we wanted to avoid," reports Harald Lißfeld, Manager of Project and Process Engineering at Hassia Mineralquellen.

Intensive real-time tests directly on the line

Reports in the trade press drew the attention of Lißfeld and the Director of Engineering and i-Logistics of the Hassia Group, Michael Schmidt, to the Landshut-based company, CavitorSystems and its Cavitor technology. First of all, a unit was subjected to very intensive tests on different bottling lines. "We installed the cavitor directly on the line and in this way were able to obtain all the data under practical conditions. For example, we had the possibility of always being able to switch the Cavitor in or out to obtain a direct comparison for a product run under identical conditions." Usually these tests take place at different times, often even after an interval of many hours or even days, so that only tentative conclusions about the effectiveness of a system can be obtained. "This was not the case with our test set-up and so it was quite clear at the end of the tests



The mixing system was supplied as a plug&play version and is controlled by the respective line charger

that we could remove all the cooling units and run at maximum capacity (up to 33,000 bottles/hour depending on the line) – and with substantially reduced foaming! We achieve a clear increase in performance of up to 20% and save on the rental for the cooling units and their electricity costs. In addition the fruit and vegetable juices are mixed significantly more intensively which means that the filling valves don't become blocked any more. These are really great advantages which reap vast benefits and keep the amortisation period very short," says Lißfeld.

Cavitation and its possible applications

The problem of excess foam with carbonated beverages, particularly sweetened drinks, results from the too rapid release of bound CO₂ in the form of coarse bubbles. "Cavitation" is taken to mean the formation of cavities in liquids when the pressure falls below the liquid gas pressure. This physical process is produced through the design of the cavitator and used for a significant improvement in the mixing of gases and liquids.

CavitatorSystems GmbH in Landshut is commercially implementing its patented technology, the *mixing of liquid, semi-liquid and gaseous media through cavitation* and is involved in the development and manufacture of industrial systems for mixing various products and substances in the food and non-food sectors.

If a liquid is forced through the patented cavitator (manufactured in stainless steel and fitted with several, differently arranged plates) at high pressure, a large amount of turbulence arises in the liquid as well as bubble formation due to cavitation. Shear forces and implosions divide the single small bubbles into many more and intensive, homogeneous mixing is obtained. The "cavitator" mixing technology involves a modern, very effective and previously unknown technology based on cavitation. Cavitators are used for mixing, emulsifying, homogenising, dispersing, dissolving and saturating liquids amongst one another or with

gases. They are also used for aerating liquids. The technology is excellently suited to stabilising beverages which tend to foam, for degassing and gassing mineral water and ready-to-drink beverages as well as for the mixing of additives to the basic ingredients. A cavitator can be employed singly or in a combination for many applications. A system can be installed as a "retrofit" in existing systems or as an impregnation system or mixer for beverage manufacture with one or several cavitators and the associated measurement and control technology.

Seven PET reusable-bottle lines equipped

Hassia ordered eight complete systems of the type "CAVSYS® Cavitator AF-80" and "AF-100" as plug&play version for the PET reusable-bottle lines at the locations

Bad Vilbel, Rosbach, Lichtenau, Thüringer Waldquell and Glashäger. The systems are employed for the intensive mixing and stabilisation of mineral waters, lemonades, spritzers and Cola beverages. The complete system was supplied by CavitatorSystems with frequency-controlled pressurising pump, pressure measurement and control. The Cavitator is controlled via the respective line charger. The product is brought up to a pressure of >10.0 bar in a pump directly before the cavitator; within the system this figure drops to about 6.0 bar. The beverage flows with the pressure required at the charger to the filling machine.

Additional benefits of the Cavitator

Harald Lißfeld highlights some further advantages: "Of course, the cooling units which we previously used concealed some potential



Up to 33.000 liters/h of unchilled product can be stabilised

dangers – for example, coolant leakage or defects in the cooling system. These negative aspects are now eliminated! Similarly, due to the cooled content and the resulting condensate that formed, we always had problems with labelling, but this issue too is settled by using the Cavitator!"

During its test Hassia also examined in great detail the reaction of the Cavitator to alkalis and acids during the automatic CIP cleaning. "There were no problems nor any significant microbiological findings; there is no problem at all in cleaning the cavitator. Similarly, the system demonstrated neutral behaviour to possible pressure surges during running up and with interruptions. And the system can compensate for the temperature differences of our beverages from the tanks during winter (13°C) and summer (20°C). Apart from the promised and achieved increases in performance, the reduction in energy costs and

the prevention of foaming, I must mention the excellent co-operation and liaison with CavitatorSystems. We worked together in a very pleasant, friendly relationship," Lißfeld emphasises.

Cavitators also for planned innovations

There are some new beverage developments within the Hassia Group, which will soon be launched on the market. Here too, the Cavitator technology has already been used successfully. "We have not only solved existing problems, but we have also made the right investment for the future. The results from our tests with the Cavitator have convinced us technically and in particular with regard to the economic benefits to such an extent that we have purchased and installed a total of eight complete units," adds Managing Director, Michael Schmidt.