



# APV Cavitor Technology in Food and Beverage Processing

A NEXT GENERATION MICROSCOPIC MIXING AND SCALE FREE HEATING TECHNOLOGY

## The powerful forces of cavitation produce results that far exceed those of conventional technology

The APV Cavitor is a new breakthrough technology for very efficient microscopic mixing and scale-free heating based on controlled hydrodynamic cavitation.

Food and beverage processing can typically be divided in three process steps. The first step covers raw materials/ingredients preparation including hydration and functionalisation and pre-emulsification. The second step is the main processing including mixing and blending or incorporation of the base raw materials and ingredients followed by dispersion/homogenisation, emulsification and usually also thermal treatment. The final step includes mixing and blending and dispersion of post additions (PA) of minor ingredients and possibly gases for aerated or carbonated products.

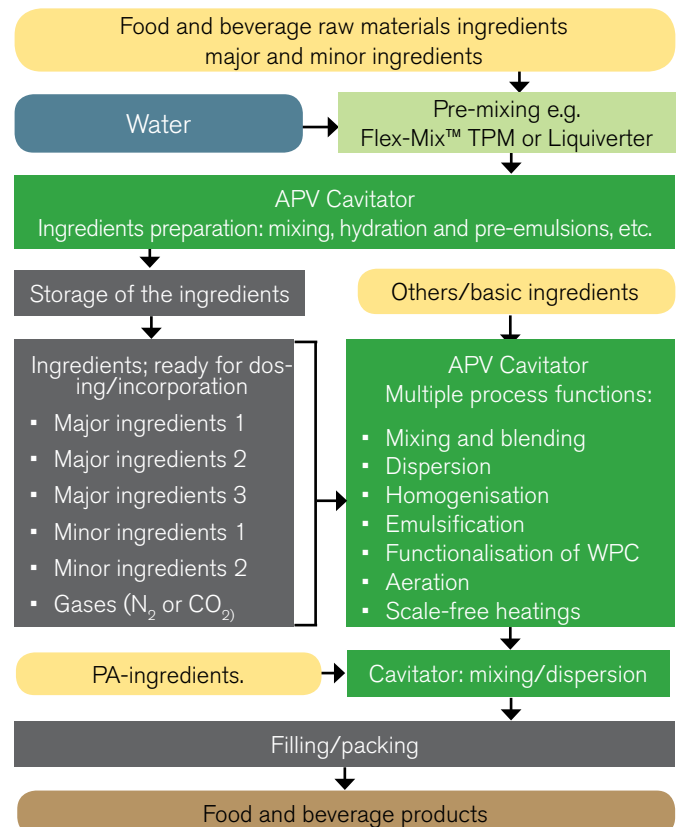
The key challenges in any food and beverage process are to maximise the product quality, the yields of the raw materials and the plant up-time or minimise the process cycles and CIP time and total cost of production. In this respect the APV Cavitor offers a wide range of benefits to the food and beverage industry that meet the needs of our customers.

## The principle of the APV Cavitor

The heart of the technology is a rotor spinning in a liquid chamber. The rotor has a number of radial holes. The spinning action generates internal liquid friction (disk friction) and the holes generate hydrodynamic cavitation. The cavitation creates high shear ensuring a very efficient microscopic mixing effect and friction which generates controllable scale-free heating.



## Processing example for food and beverage processing



## Use of the APV Cavitator in food and beverage processing

The process diagram shows the typical process steps from ingredients preparation to the main processing steps and functions and the final production step for PA ingredients addition and possibly gas dispersion.

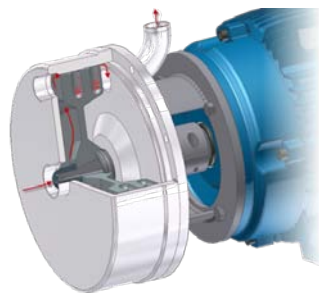
Irrespective of the food and beverage products you want to produce, several of the mentioned process functions will be included either as separate process steps or combined. Thanks to the multifunctional capability of the APV Cavitator it can be used for all of the process function shown in the process diagram.

Commercial installations in both food and beverage and personal care have confirmed the benefits of using the Cavitator technology to improve both product quality and financial results. Other application tests in the SPX Innovation Centre and at customer locations have identified several potential and attractive applications for the APV Cavitator across the food and beverage industry.

## Features and benefits of the APV Cavitator in food and beverage production

The controlled hydrodynamic cavitation technology is commercially implemented for liquid egg, meat/pet food and also personal care products like toothpaste and body wash processing. The APV Cavitator offers unique features and benefits for a wide range of food and beverage applications:

- The excellent microscopic mixing of gums and proteins ensures a fast and short hydration time resulting in product savings, shorter process cycle and extended up-time and lower OpEx.
- Use of the Cavitator for pre-emulsions in combination with high pressure homogenisation has significant potential for improved quality at lower pressure and fewer passes.
- Functionalisation of WPC through a microparticulation process for very accurate particle size distribution at 1  $\mu$  to enhance water binding, emulsification properties and creamy taste.



- The superior dispersion capability results in a homogenous mixing of minor ingredients in viscous products, improving the product appearance and quality.
- A very efficient emulsification effect delivers high quality mayonnaise and dressings, as well as recombination of dairy protein and butter.
- The Cavitator has no heat transfer surface and therefore no hot or cold spots. This makes the Cavitator a potential heating device for high fouling and heat sensitive products like liquid egg, whey proteins, puddings, cheese and BBQ sauces. The result is long run time and fewer CIP cycles. And the gentle heating protects the functional properties of the proteins.
- The Cavitator can be used to distribute any gas media like N<sub>2</sub> or CO<sub>2</sub>, and the highly efficient dispersion ensures very small and equal gas distribution in the foamed mousse product or carbonated beverage.
- Highly reliable and sanitary design meeting 3A and EHEDG standards
- Low maintenance time and cost also contribute to the overall reduced OpEx.

The APV Cavitator can be delivered as a single unit or as a plug & play skid mounted system

## SPX Innovation Centres in Denmark

Research and development are important elements in SPX's activities in general. Food and beverage and personal care manufacturers are increasingly seeking cost efficient process solutions for the production of high quality innovative products.

In this process the SPX Innovation Centres have an important role to play in close cooperation with the SPX companies and SPX customers around the world.

The SPX Innovation Centres are an active participant in all types of development, testing and application of the SPX equipment, systems and process solutions. All our facilities and services are designed to provide added value for our customers. Our Innovation Centre in Silkeborg, Denmark is specialised in liquid and viscous food and beverage, and personal care tests and development.

## APV Cavitorator test and pilot plant service

APV Cavitorator pilot plants are available for tests in our Innovation Centre in Silkeborg, Denmark and for rental to our customers. from Silkeborg Denmark, and Delavan, USA.

Our technology specialists are available to help our customers with a wide range of services including:

- Product and application screening
- Pilot plant testing with scalable results
- Pilot plant equipment rentals and start up
- Validation of products, technologies and applications
- Innovation of new products, technologies and applications
- Practical and theoretical training for customers
- Recipe development and process optimisation
- Laboratory services incl. microbiological and chemical analyses, functional analyses and particle size distribution
- Advise of integration of the Cavitorator in existing and new commercial plants to maximise the features and benefits of the APV Cavitorator.



*APV Cavitorator Pilot Plant for customer rental*

**The APV Cavitorator can be used for a wide range of applications and products across the food and beverage markets.**

### Liquid egg products



### Ice cream mix



### Dairy and food powder ingredients



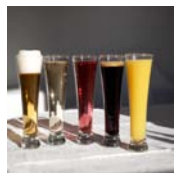
### Fresh dairy products/ yoghurt and desserts



### Processed and fine food products



### Nutritional and carbonated beverage and beer



### Meat, poultry, seafood and pet food



### Bakery and confectionery





## SPX Innovation Centre and Cavitator pilot plant services



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