



# APV Cavitator Technology in Mayonnaise and Salad Dressing Production

A NEXT GENERATION MICROSCOPIC MIXING AND SCALE FREE HEATING TECHNOLOGY

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

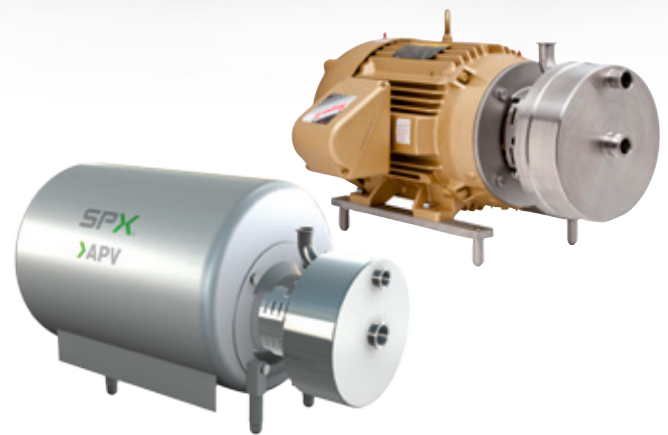
Today, processors are challenged to make a wide variety of mayonnaise and salad dressing products. SPX can provide very flexible systems to prepare the ingredients, pre-mix them in the proper ratios, and emulsify them to create the desired appearance and quality. Although they may differ radically in viscosity and formulation, all these products are basically oil-in-water emulsions. The critical processing step that determines their final viscosity and shelf stability is emulsification. The APV Cavitator is a break-through microscopic mixing technology that gives processors control of the oil droplet size by means of a flexible adjustment of the cavitation intensity. Droplet sizes in the range of 3 to 5 microns are easily attained through the intense action of controlled cavitation shock waves.

Mayonnaise recipes may include 50 to 80% vegetable oil, and lower fat versions are produced using starch as a thickening agent. The water phase typically includes vinegar, salt, sugar, mustard and stabiliser. Egg yolk acts as the emulsifier to stabilise the oil droplets, giving long shelf life without losing viscosity. Mayonnaise formulations and final viscosity vary widely in different regions of the world, but the versatile Cavitator can produce the desired consistency with ease.

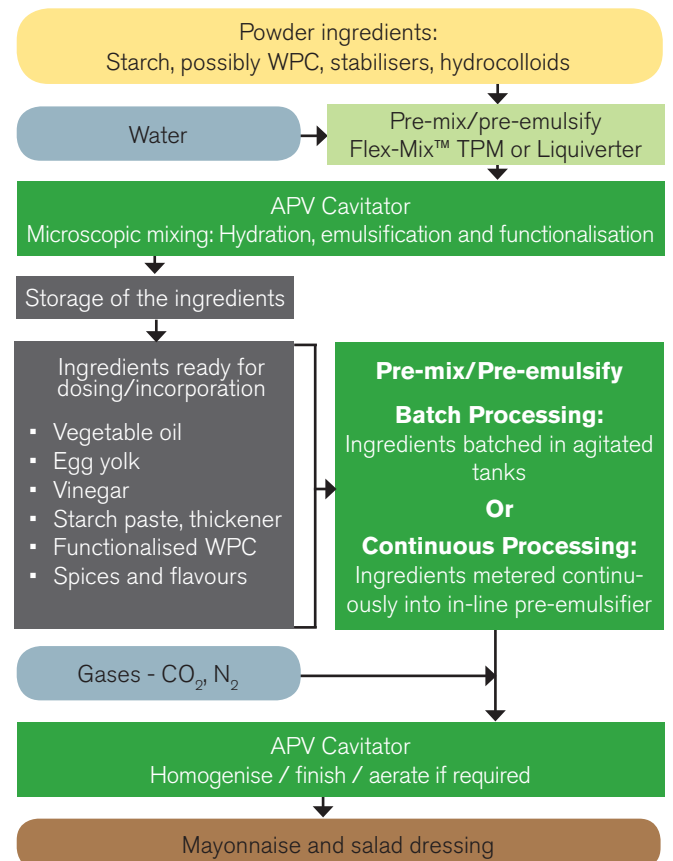
Salad dressings are made in many variations of flavours and colours added to the base oil-in-water emulsion. The recipe may contain whey proteins or other emulsifiers, starch paste, and a variety of seasonings and spices. The tightness of the emulsion and its gloss and colour may be changed by modifying the rotor speed of the Cavitator, to simulate a "home-made" appearance for example.

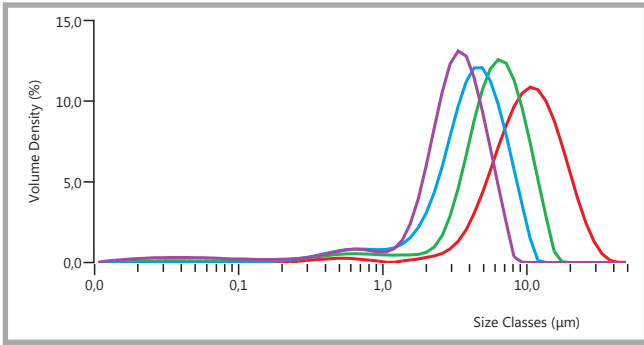
## The principle of the APV Cavitator

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 frictions (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 diagram for mayonnaise and salad dressing processing

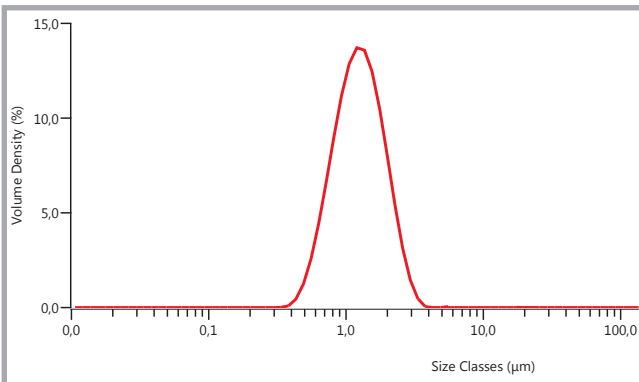




Graph shows particle size distribution of typical oil-in-water pre-mix (red) and Cavimator results at 40 Hz (green), 50 Hz (blue), and 60 Hz (violet)

### Use of the APV Cavimator in mayonnaise and salad dressing production

The Cavimator provides the key step of creating the final emulsion and achieving the optimum product viscosity and stability by reducing the oil droplet size and thoroughly distributing the emulsifier and stabiliser ingredients over the oil/water interface. It can also be employed to completely hydrate any powdered ingredients like starch or whey proteins, before they are metered into the pre-mix equipment. In addition to hydration, the Cavimator can be used for microparticulation of whey protein concentrates (WPC) to enhance functional properties and create the ideal particle size for a creamy mouthfeel as a fat substitute.



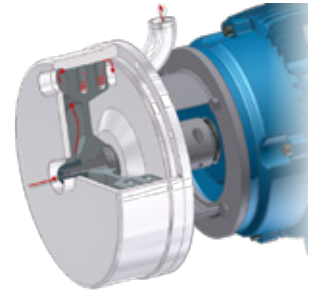
Particle size distribution of functionalised WPC

### Features and benefits of using the APV Cavimator

The intense microscopic mixing action produces a narrow distribution of oil droplets, with size range controlled by the cavitation intensity in the cavitation zone. The emulsifying effect is con-

trolled simply by adjusting the motor speed electronically, rather than mechanically adjusting a clearance as in a colloid mill.

- The accurate control of droplet size and tightness of the emulsion can be used to produce a very consistent product viscosity and appearance, provided the Cavimator is fed with a uniform pre-mix at a constant flow rate
- Spices and other small particles in salad dressings may pass through the Cavimator without damage from the cavitation shockwaves, and without building up inside the equipment as they might in close-clearance devices
- The Cavimator is also ideal for dispersing nitrogen into mayonnaise to make a whipped version
- In addition, when used to hydrate powdered ingredients, the Cavimator can completely eliminate any fish eyes or clumping for a very smooth texture. This means less ingredients may be needed, since its full functionality will be available, thus saving cost
- Microparticulation of WPC to enhance functional properties and create a creamy mouthfeel in low fat products is yet another key benefit for the producers
- The Cavimator has a highly reliable, sanitary design meeting EHEDG standards and with 3-A certification
- Very low maintenance requirements and inexpensive repair parts contribute to reduced OpEx.



The photo shows the same pre-mix before emulsification, and at two different rotor speeds resulting in different colour due to oil droplet size

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