



# APV Cavitator Technology for Toothpaste Production

A NEXT GENERATION MIXING, DISPERSION AND HOMOGENIZATION TECHNOLOGY

## THE POWERFUL FORCES OF CAVITATION PRODUCE RESULTS THAT FAR EXCEED THOSE OF CONVENTIONAL TECHNOLOGY

Controlled cavitation is a new breakthrough technology for microscopic mixing, dispersion/homogenization and scale-free heating based on hydrodynamic cavitation.

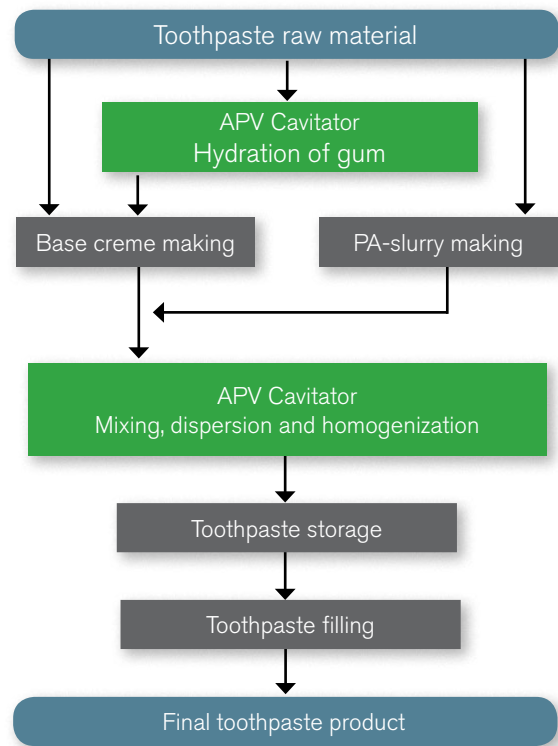
A key challenge in high-viscosity products like toothpaste is to ensure an efficient microscopic mixing, hydration, dispersion and homogenization to produce uniform and appealing product appearance and consistency. Lower systems pressure and shorter and more efficient CIP cycles are other challenges in toothpaste production. The APV Cavitator offers a wide range of benefits to the personal care industry that meet the needs of our customers.

## 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 friction (disk friction) and the holes generate hydrodynamic cavitation. The cavitation creates locally intense shockwaves ensuring a very efficient microscopic mixing effect, and friction generating controllable, scale-free heating.



## PROCESSING EXAMPLE FOR TOOTHPASTE



## THE PRODUCTION PROCESS FOR TOOTHPASTE

A typical toothpaste process starts with a very viscous dicalcium phosphate slurry, which is the abrasive component. The slurry is blended with gum solution to form a white cream base or common base (CB) and small amounts of post-addition (PA) ingredients must be dispersed to make the final products.

The PA ingredients are typically colors, flavors, whiteners, fluoride and foaming agent.

- Efficient and fast hydration of the gum for the CB is essential. In a conventional process the gum tends to form lumps which are difficult to break down.
- Mixing and dispersion of the PA components with the CB to obtain a homogeneous and appealing product. Some ingredients, e.g. hydrated silica, have a low density and are very difficult to incorporate and wet out. An even dispersion of color is another key challenge solved by the APV Cavitator.

## FEATURES AND BENEFITS OF USING THE APV CAVITATOR FOR TOOTHPASTE PRODUCTION

The controlled cavitation technology has been commercially implemented for toothpaste PA mixing. Traditional recirculation through static mixers and homogenizers was ineffective, hard to clean and caused high system pressures. Over-shearing using a homogenizer also resulted in water separation (syneresis). The new cavitation technology has several attractive features and benefits for the toothpaste/ personal care producers:

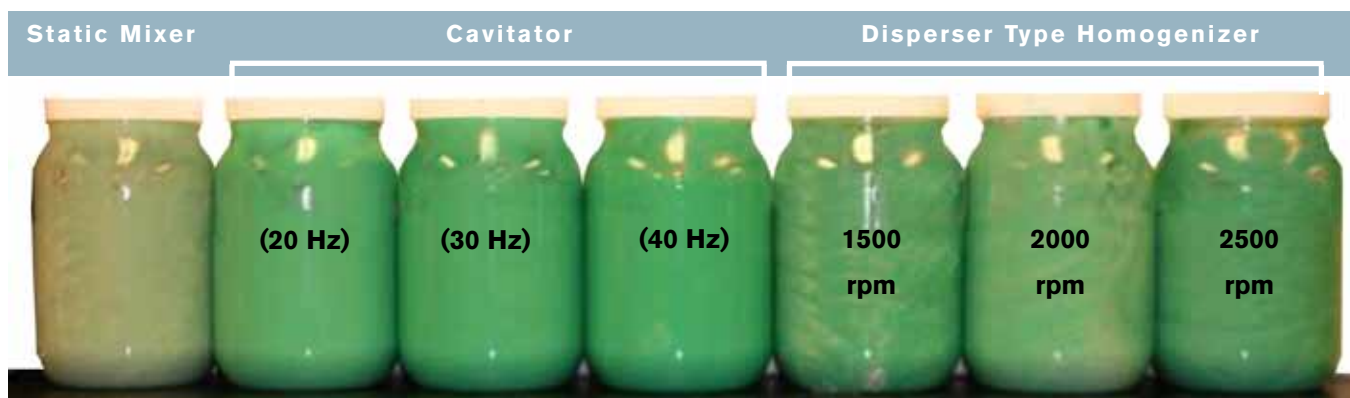
- The excellent mixing of the gum ensures a short hydration time
- The superior dispersion and homogenization produce a homogeneous mix of the color and other PA ingredients with the BC, resulting in improved product quality



- Less off-spec product at start-up, and reduced product volume in the system. Shorter ramp-up time for the cavitator compared to the conventional process.
- Savings on raw material due to improved dispersion
- Lower system pressure resulting in lower operational cost
- Simpler design with reduced pressure drops compared to static mixers
- More flexibility for different products with different mixing needs
- Faster and better CIP and sanitizing cycles resulting in lower operational cost and lower contamination risk
- Lower maintenance time and cost
- Highly reliable and sanitary design meeting 3A and EHEDG standards
- The APV Cavitator can be delivered as a single unit or as a plug & play skid mounted system

## OTHER POTENTIAL APPLICATIONS FOR PERSONAL CARE

In addition to highly efficient mixing and dispersion, the APV Cavitator also has potential for pre-emulsions in combination with a high pressure homogenizer for uniform particle size. Furthermore the excellent gas dispersion opens up possibilities for production of aerated cosmetic crème moussé.



APV Cavitator in comparison with static mixer and homogenizer. Mixing colour and other PA ingredients with high viscous BC liquids.



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