The Innovative APV™ Cavitator

The Next Generation in Mixing and Heating Technology

Mixing and dispersing have never been more challenging. Margins are being squeezed, safety is paramount and consumer demands for new products make formulation changes a regular occurrence. The ability to improve mixing process efficiencies, enhance product quality and heat liquids efficiently and without scale build-up is a must.

To meet these challenges head on, you need a partner with a deep understanding of process engineering and a broad portfolio of equipment. Look to SPX and its industry leading brands to provide extensive technical support, equipment versatility and mixing and processing expertise. Explore the diverse solutions that SPX has to offer. You're sure to find answers that will improve plant performance, increase profitability and enhance the value of your brand.

Situation:

A liquid soap manufacturing plant of a large company in the Northeast had an issue with "gel balls" caused by incomplete hydration of gum powders in the production of body washes and other personal care products. This lead to wasted gum powder, maintenance and downtime issues.

Challenge:

The batch tank would have to be manually cleaned to remove the often softball and bowling ball-sized gel agglomerates.

Solution:

The gum was loaded using a Venturi-based powder mixer and the APV™ Cavitator was placed just after this to allow for complete gel hydration. Cavitation can be used to hydrate gums, gels and polymers in seconds. The process intensity helps to more completely hydrate the powders than with conventional mixers in a fraction of the time. The shockwaves can also break up dry powder agglomerates often referred to as "fish eyes." This can result in raw powder savings, higher viscosity or higher quality due to more efficient use of the gum and a more uniform product. The liquid soap manufacturer received a reduction in mix time (batch cycle time) and improved cleaning. More homogeneous mixing at the Cavitator reduced the needed tank agitation. The payback of the APV Cavitator was less than one year considering the cost of batch time, gum powder saving and decreased clean-up time.

HOW THE APV CAVITATOR HARNESSES CAVITATION

The heart of the technology is a specialized rotor with cavities. The spinning action generates hydrodynamic cavitation within the cavities away from the metal surfaces. Cavitation is the sudden formation and collapse of low-pressure bubbles in liquids by means of mechanical forces. The bubbles release an energy wave into the surrounding liquid. This energy wave is commonly known as a shockwave. Uncontrolled, cavitation can be very destructive to process equipment such as pump impellers. This cavitation is controlled, therefore there is no damage. As a liquid passes through the APV Cavitator, it is subjected to controlled cavitation. Microscopic cavitation bubbles are produced, and as they collapse, shockwaves are given off into the liquid which can emulsify and prevent scaling. During heating, temperature is created uniformly throughout the entire liquid without any heat transfer surfaces. There are no hot or cold spots.

THE APV CAVITATOR COMPARED TO CONVENTIONAL TECHNOLOGY

Inside the APV Cavitator, there is a spinning rotor producing millions of microscopic cavitation bubbles. When these bubbles collapse and produce shockwaves, powerful forces are generated that cut up the process material into microscopic sizes. This increases the surface contact area between the liquids, gases and/or solids being mixed and maximizes the efficiency of the process for processes such as hydration, emulsification and gas/liquid mixing. Conventional batch mixing normally occurs in large tanks containing an impeller that constantly stirs the contents in hopes of achieving uniformity. Because the tanks are normally very large, it requires long process times in order to achieve uniformity. In many cases, a completely homogeneous mixture cannot be achieved. The APV Cavitator can normally mix the same amount of liquid as the conventional tank in less time while achieving uniformity. This occurs because powerful forces of cavitation are applied to

a limited volume of liquid inside the APV Cavitator as it passes across the cavitation zone. In a commercial APV Cavitator, a typical rotor contains a number of cavities in which cavitation occurs. As material passes through the APV Cavitator, the volume is equally divided into all of the holes. Each cavity performs like a miniature agitator cell that treats a small portion of the liquid, whereas a conventional tank has a single agitator or shear mixer that attempts to mix the entire volume. This level of mixing is not obtainable using conventional technology. The APV Cavitator makes it practical.

ABOUT SPX

Based in Charlotte, North Carolina, SPX Corporation (NYSE: SPW) is a global Fortune 500 multi-industry manufacturing leader. The company's highly-specialized, engineered products and technologies serve customers in several growth markets. For more information, please visit www.spx.com.

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