



## EDITORIAL

April 2013

### Mixing Solutions for the Dairy Industry

SPX provides leading service and process solutions to the dairy industry. Included within its innovative technologies is the SPX APV 'Flex-Mix' series, consisting of seven mixers to meet very broad application requirements including mixing powders, liquids, particulates and even air for high and low viscosity fluids. The technology ranges from simple static and venturi mixers to innovative vacuum mixing provided by the Flex-Mix Instant and Processor models.

#### Liquid/Liquid Mixing

For liquid/liquid mixing, the range offers the economic Flex-Mix TPX static mixer which is ideal for blending two simple, low viscosity liquids. It also includes the Dar dynamic mixer which provides more turbulence and is perfect for blending low viscosity with high viscosity fluids in applications such as the low temperature mixing of vegetable oil with butter.

#### Liquid/Powder Mixing

Liquid/powder mixing is very common within the dairy industry and the Flex-Mix range offers three different methods of powder transportation to best suit the application. The TPM mixer uses the venturi effect to carry the powder into the liquid and is typically used for the dispersion of highly soluble powders such as sugar. The Liquiverter provides semi-continuous or batch mixing using a vortex formation to combine powders and liquids. The liquid is accelerated in a tank to create the vortex whirlpool and the liquid collapses around powder which is added to the surface from the top. The air introduced into the mixture is lower than with the venturi based method and this technology provides efficient mixing for applications with low to medium solid levels.**Flex-Mix Instant**



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The SPX brand APV Flex-Mix Instant mixer offers exceptionally efficient performance for all kinds of recombination applications including ice cream, desserts, infant formula and sweetened condensed milk. It has a closed vacuum powder transport system which sucks powder underneath the liquid surface to facilitate wettability and dispersability of difficult to mix powders. The wet and dry phases of the process can be completely separated, reducing the risk of microbiological issues. The Instant mixer consists of an in-line rotor/stator mixer which is connected to a tangential outlet in the bottom of the tank. The In-line mixer is both pumping and mixing the product and thus creating a large liquid flow, which is re-circulated over the tank through a bypass. The powder/air mixture is led directly into the liquid below the liquid surface and due to the reversed cone shaped bottom a forced vortex is formed, due to the difference in density, a separation of air/gas and liquid will take place very fast. The air/gas is centred in the middle of the tank and is subsequently drawn out. The large free liquid surface furthermore gives an effective and continuous deaeration of the product. This will help to reduce oxidation, as well as improve product quality and consistency.

For top fed mixers, a higher flow rate forms a free vortex which cones down through the mixer, introduces air and impacts mixing quality. The special design of the Flex-Mix Instant enables higher solid contents to be used. Its improved mixing efficiency enables a higher concentration pre-mix and greater mixing capability, resulting in significant improvements in capacity and production economy.

Shear rate is important for the quality of the end product. It is a function of the speed of the mixer divided by the distance between the rotor and stator and an increased shear rate produces pre-emulsions with small and narrow particle size distribution. The combination of speed and the short distance between the rotor and stator on the Flex-Mix Instant provides higher mixing capability per kilowatt of power, improving the energy efficiency of the process. Resulting shear rates can be achieved to create particle sizes of around two microns for very high quality, smooth product characteristics.



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The powder transport system on the Flex-Mix Instant uses innovative (patent filed) technology to address the issue of potential back flush of liquid into the powder section. The new SPX APV invented powder intake valve system is based on 3 valves, which open and closes in special sequences with individual delay set points. The valve seats and seals are kept dry and clean during long operations. This insures an extended life time of the valve seals and enables reliable production with fewer failures caused by blocking the powder valve. Furthermore, the outer valve can be dismantled while there is still liquid in the mixer tank, making inspection and cleaning much easier and quicker.

Overall the ability for increased hygienic powder intake, high shear rates and vortex independent operation of the Flex-Mix Instant bring real benefit to the mixing process with increased efficiency, higher capacity, better production economy and premium end product quality. There are further advantages gained in other process steps as the quality of the pre-mixing ensures the homogeniser runs smoothly. In addition, the removal of air from the mixture with the vacuum intake system reduces pasteuriser fouling, increasing the run time between clean in place (CIP) cycles. The closed powder transport system also stops airborne powder dust, improving the working environment.

### **Liquid/Particle Mixing**

For applications where particles are dosed into the liquid a high shear mixer is normally used to create the basic sauce. To add particulates, the mixing is stopped, particulates added and an agitator in the vessel gently distributes the particles to avoid damaging them while preventing sedimentation. For such applications the Flex-Mix Processor, which is also a vacuum based mixer, provides fast dispersion of powders using an aggressive bottom mixing unit, ideal for high complexity products over a full range of viscosities. It has the added capability to blend delicate particulates into the solution with an efficient and gentle agitator.



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### **Liquid/Air Mixing**

The requirement to introduce air into a blended liquid is common in the dairy industry to create foamed desserts such as mousses. To ensure best end qualities are obtained this process requires a high shear to ensure small bubble size with a long residence time to stabilise the product. The Flex-Mix Power in-line pin mixer offers an aseptic aeration solution with very precise control of air overrun for product stability. The rotor/stator pin configuration ensures a very high shear for dispersion and premium product quality.

### **Complete Systems and Support**

Alongside the wide range of innovative mixing technologies, SPX can deliver complete, turnkey processing lines as its experience within the dairy industry is vast. SPX understands the modern issues and challenges faced to provide flexible and competitive production solutions. Supporting its technology are the SPX Innovation Centres which offer customers the capability to trial, test and compare recipes and process solutions. Fully supported by the expertise of highly trained engineering staff, the centres enable new products to be brought to market quickly in order to achieve production goals.

### **Summary**

The variety of mixing solutions provided by the SPX APV Flex-Mix range ensures optimised performance across all dairy applications. The range offers high sanitary standards, versatility and reliability. Advanced technological designs maximise efficiency, performance and quality for the most complex formulations. This comprehensive range of mixing solutions is supported by a vast expertise within the dairy industry and advanced Innovation Centres for the rapid development of products and processes to meet exact requirements.



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SPX is proud of its history within the dairy industry and continues to develop and innovate with technology that is designed to produce consistently high quality results, improve operational efficiency and increase production capacity for a rapid return on investment.

### **About SPX Flow Technology**

Part of SPX Corporation (NYSE: SPW), the Flow Technology segment designs, manufactures, installs and services highly engineered solutions used to process, blend, meter and transport fluids, in addition to air and gas filtration and dehydration. The segment supports the food and beverage, dairy, pharmaceutical, oil and gas, energy, and industrial markets worldwide.

### **About SPX**

Based in Charlotte, North Carolina, SPX Corporation (NYSE: SPW) is a global Fortune 500 multi-industry manufacturing leader with over \$5 billion in annual revenue, operations in more than 35 countries and approximately 15,000 employees. The company's highly-specialized, engineered products and technologies are concentrated in Flow Technology and energy infrastructure. Many of SPX's innovative solutions are playing a role in helping to meet rising global demand for electricity and processed foods and beverages, particularly in emerging markets. The company's key products include food processing systems for the food and beverage industry, critical pumps and valves used in oil & gas processing, power transformers used by utility companies, and heat transfer technology for power plants. For more information, please visit [www.spx.com](http://www.spx.com).

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**Flex-Mix Liquiverter**



**Flex-Mix Instant**



**Flex-Mix Processor**