

New Tetra Pak mixer delivers better mixing and lower energy consumption

The Tetra Pak® High Shear Mixer R370-1000D is a patented mixing solution, which is revolutionizing the mixing process for huge potential improvements in cost savings and product quality. The innovative new design moves the mixing head and high viscosity pumping device outside of the traditional mixing tank – and it replaces the mixing tank with a dedicated deaeration unit.

By Søren Steffensen, Commercial Product Manager

Mixing is often the first in a long line of processes and it greatly influences product quality and production costs in food production. If not done properly, unwanted air in the product and inefficient mixing negatively influences the downstream processing. It increases costs, shortens shelf-life and compromises food safety and quality.

To solve some of these key issues, the new generation high shear mixer is designed with both the mixing head and the high viscosity pumping device placed separately outside of the traditional mixing tank. Each of these devices have been optimized to obtain the highest mixing and pumping efficiency. In addition, Tetra Pak have replaced the traditional mixing tank with a dedicated deaeration unit. Also, all of these components are designed to be independently controlled to give the greatest possible flexibility and control over the mixing process. This in turn enables producers to achieve super-

ior emulsification, powder dissolving and deaeration performance and run high viscous products in a continuous or recirculation setup.

Superior emulsification, powder dissolving and deaeration performance

The new solution enables better emulsification performance – reducing energy consumption, ensuring quality and giving food producers better utilization of ingredients. The very high shear – up to 100,000 reciprocal seconds, in a five-stage mixing process – means we have the unique ability to deliver down to one micron fat droplet size. This is very difficult, if not impossible, to achieve with other mixing solutions. The size of the droplet influences the taste and mouthfeel of the products and increases their stability. The smaller the droplets, the more stable the product is, meaning less high pressure homogenization downstream

is needed. Food producers can actually reduce homogenization pressure.

All this reduces the energy consumption significantly. And the improved powder dissolving performance also enables better utilization of ingredients, such as stabilizers, allowing to use less of these ingredients in the recipes. Thus, energy savings and ingredient savings combine to reduce the total cost of ownership for the whole solution.

Furthermore, the new setup prevents unwanted air incorporation and removes air effectively to ensure high product quality and an improved downstream process. It may even allow to eliminate additional downstream deaeration for even greater savings on equipment and energy costs. Improved powder introduction, thanks to the new powder hopper design, prevents excessive amounts of air entering product with the powder ingredients. And a flexible setup lets you place the powder



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handling where you want it without risking increased air incorporation.

Run higher viscosities and higher dry matter content

In large scale production, recirculation is more cost-effective than batch processing but normally there are constraints when it comes to high viscosity products. High product viscosity often makes recirculation mixing difficult. The new setup handles viscosities of up to 2,000 cP, where most typical recirculation solutions cannot go above 200 cP. This enables food producers to produce high viscosity products such as ketchup and dairy desserts much more efficiently. The new setup also enables to mix products with higher dry matter content – up to 80%. This opens up for huge savings in infant formula production for example, where having higher dry matter content means much lower costs for evaporation later on.

Thinking outside the tank to revolutionize mixing

The special patent-pending mixing head design allows very narrow tolerances and very high speeds in the rotating device. This provides high mixing intensity with ultra-high levels of turbulence and shear rate. The design also secures that no product passes the device without being subjected to this high intensity mixing region multiple times. In

comparison, in traditional rotor stator systems most product often bypasses the high intensity region and passes through the mixing head only once. In the new Tetra Pak High Shear Mixer R370-1000D, the product is forced to go through the high intensity region at five stages. And since it is placed completely outside of any tank, it causes no turbulence or vortex that could incorporate unwanted air into the product.

The high viscosity pumping device is also placed outside the tank and is also separately controlled. Its unique design makes it able to pump both high and low viscous products without risking cavitation – despite being located just downstream of the deaeration unit where the suction pressure is very low, i.e. down to 0.15 bar. Unlike typical centrifugal pumps, which would lose pumping ability at this low pressure, the twin-screw pump continues to work efficiently and also treats products very gently.

A dedicated deaeration unit with a

specially designed inlet distribution nozzle and a large interior cone inside a vacuum tank now replaces what once was the mixing tank. The geometrical design of the inlet nozzle ensures that the product is calmly and evenly led onto the conical structure and distributed over it in a very thin layer. This allows any air bubbles to rise quickly to the surface and be removed, while ensuring that the product surface flows smoothly and calmly without turbulence or splashing.

All in all, this patented new mixing solution prevents air in the process and products and offers a very flexible mixing for a wide range of ingredients and viscosities. And it achieves this while also ensuring great efficiency to keep total cost of ownership and carbon footprint as low as possible. ■

