

Densification Of Dry Powdered Detergents

Until recently, the manufacture of most dry detergent products relied on the spray drying process to produce a light density powder product (approximately 18-22 lb/ft³). The spray dried powder consisted of homogeneous, hollow, spherical particles.

Reducing the overall cost of producing dry detergents provided the driving force behind the development of more densified products. Densification of the detergent results in reduced packaging costs and packaging waste, reduced shipping costs and smaller shelf space requirements at the point of sale.

When leaders in the detergent industry began searching for a process to densify detergents, they quickly arrived at the concept of using a high speed continuous mixer to achieve their goals. A mixer densifies the product by adding work energy to the product via mechanical shear.

The continuous mixer/mixing systems best satisfying industry's needs are the Littleford CB Series High Speed Processor (as a stand-alone unit) and the CB used in combination with a larger Littleford KM Series Continuous Ploughshare Mixer. The desired level of densification determines which equipment configuration is used.

The Littleford CB Series High Speed Processor features a jacketed, horizontal, clam shell-type mixing chamber. The horizontal shaft utilizes a significant quantity of specially designed feeding and mixing tools arranged in a spiral-like pattern. The special shape and arrangement of these tools supply high shear mixing rates and promote material transport through the mixer. Liquid may be added via a distribution manifold system located at the lower half of the shell.

The typical retention time of detergent product in the Littleford CB Series High Speed Processor is 15-20 seconds. During that time the product is subjected to intense mechanical shear causing the fragile spray dried granules to break up and densify. Increases in product density of up to 50% are common (or an approximate increase to 25-30 lb/ft³).

If further densification is required, the product may be transferred from the Littleford CB Series High Speed Processor to the Littleford KM Series Continuous Ploughshare Mixer. The KM Mixer provides additional mechanical shear via the rolling/agglomerating action of the curve-sided mixing tools, or "plows". Liquids can also be added in the KM Mixer. High speed impact choppers are used to aid in both dispersion of the liquids and breaking up any lumps. The retention time in the Littleford KM Series Continuous Ploughshare Mixer normally ranges from 5-10 minutes. Final product densities of 45 lb/ft³ or greater are achieved.

In summary, final product density increases of up to 100% relative to the original starting material may be achieved using the Littleford Day densification technology.

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