



How to prevent lumping during dispersion of powdered ingredients

Uniform blending of poorly dispersible powdered ingredients boosts plant productivity and food quality

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When adding powdered ingredients into food processing lines, the use of the right mixing equipment not only can prevent lumping, but can also increase productivity, enhance product quality and reduce energy costs. Powders are common ingredients of the modern food industry. Difficult-to-disperse powders pose challenges for food manufacturers due to formation of lumps or “fish-eyes”. Alfa Laval has developed a versatile new system for high-speed dispersion of powdered ingredients, even the most challenging ones, which maximizes uptime while reducing initial investment, operating and maintenance costs.

Introduction

Powdered ingredients are widely used in the manufacture of food products. In particular, the use of powder additives and functional ingredients, such as texturizing additives, nutrients, flavours and colourants, has increased tremendously over the past decades. While these ingredients bring flexibility and consistency to food products, they also present challenges with regard to incorporating powder dispersion units into processing lines.

Most powder mixing technologies require several motors for the supply pump, booster pump, agitator, discharge pump and tank cleaning device. This generally results in higher investment and energy costs. To address these issues, Alfa Laval has developed an innovative dispersion system that combines two individual types of equipment. This compact, highly reliable system features a single motor that handles all of the tasks of conventional powder mixing systems, yet delivers up to 50% in energy savings, superior mixing efficiency, reliable and repeatable mixing quality, and product homogeneity.

The challenges of dispersing powdered ingredients

There are various types of powdered ingredients added to food processing lines.

Easy-to-disperse powdered ingredients, such as granulated sugar or skimmed milk powder, generally do not pose lumping problems because moderate shear is sufficient to ensure rapid dispersion and dissolution of the individual powder particles. However, moderate shear proves challenging when dispersing texturizing additives and water-binding powdered ingredients, such as hydrocolloids or concentrated protein powders.

Texturizing additives in powder form are used in many food formulations to optimize texture and mouthfeel. These include, for example, xanthan in vinaigrette, pectin in yoghurts and fruit preparations, sodium carboxymethyl cellulose (CMC) in beverages, and alginates in desserts and ice cream. Due to the exceptionally high water-binding properties of these hydrocolloids, the dosing level is very low, typically between 0.1 and 0.5 percent of the formulation and sometimes even less. However, these high water-binding properties also pose problems during dispersion. When the powder comes into contact with water or