

## APPLICATION REPORT DRY DAIRY POWDER PROCESSING



# Kemutec Mills and Sifters

**Dried dairy powders were first mentioned in the early 1300's by Marco Polo. He wrote about the Mongolian Tatar troops during Kublai Khan's time who relied on paste-like sun-dried skim milk for their nutritional needs.**

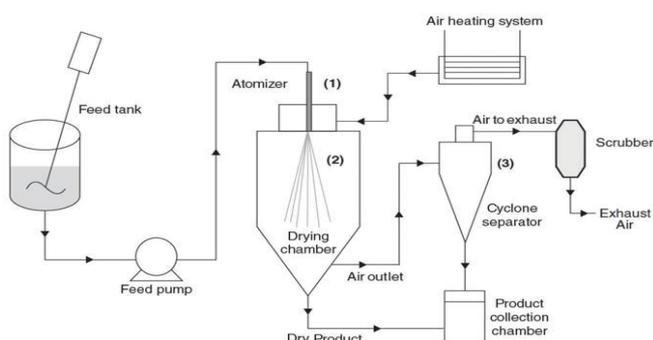
Today, dried dairy powders are offered as whole, low fat and nonfat milk, buttermilk, cheese, ice cream, whey, yogurt, sour cream, butter powder, caseins and caseinates.

### How to produce dry dairy powders

#### 1. Spray Drying

Milk, whole, skim or buttermilk, etc., is concentrated in an evaporator to approx. 50% milk solids. Subsequently, this concentrated milk is sprayed into a heated chamber, evaporating the water instantaneously.

This process, generally referred to as "Spray Drying", produces fine milk powder particles. Below is a typical spray dryer flow diagram.



#### 2. Drum drying

A thin dairy product coating is applied to a heated drum surface for evaporation. This process typically produces a flaked product which alters the properties of the dairy powder including flavor, solubility, and bulk density.

### How to densify dried dairy powders before packaging

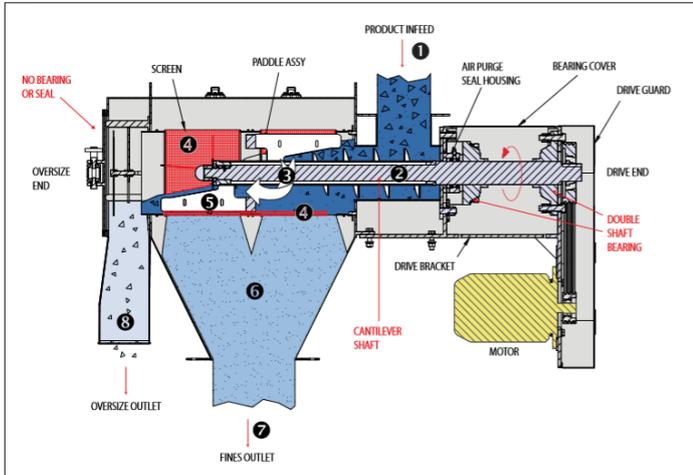
A significant, almost universal problem with dairy powders processed as described above, is to ensure that the Bulk Density is as consistent as possible. Packages (e.g., bulk bags, paper bags, sacks, polyethylene lined kegs, retail packs, etc.) need to be filled evenly because the majority is sold by weight.

### Processing solutions resulting in increased and uniform bulk density

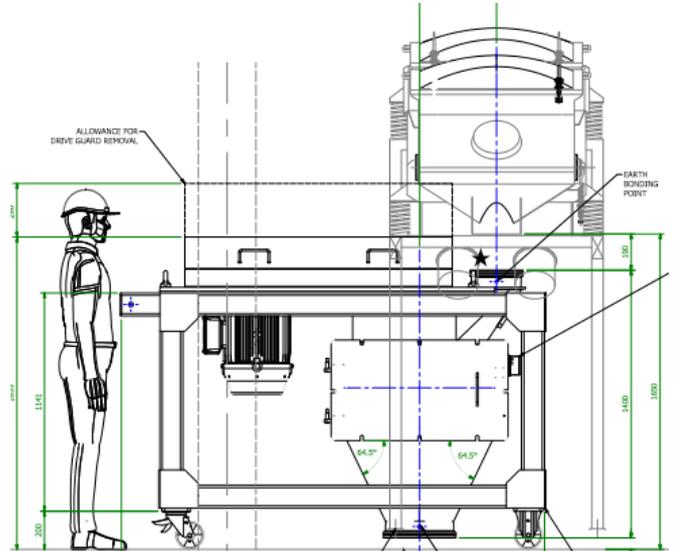
A. Kek Cantilever Centrifugal Sifters are a popular choice

Kek Sifters de-agglomerate Dairy Powders. The process increases the bulk density by simultaneously removing hard undesirable and/or contaminant particles.

Below is the cross-section of a Kek sifter used for this purpose.

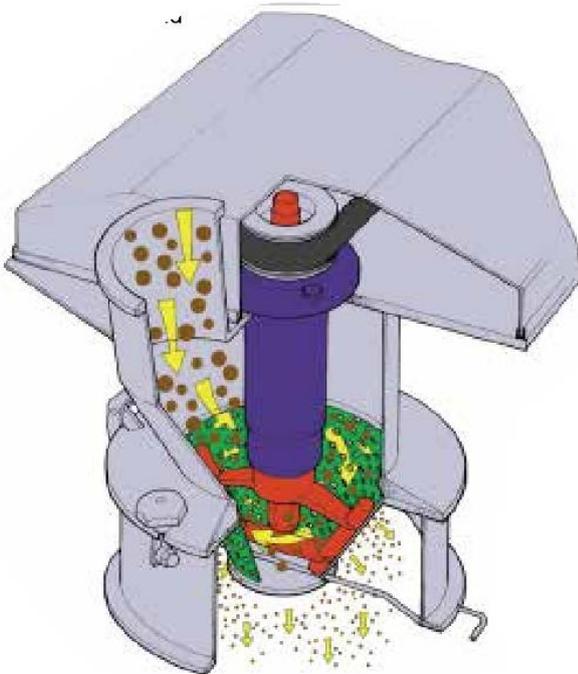


Below is a Kek 680 Cone Mill which increases the Bulk Density of spray-dried Creamer from 28-31 lbs/ft<sup>3</sup> to 37-40 lbs/ft<sup>3</sup> before packaging at 8 TPH.



B. Kek Cone Mills are the most popular choice for uniformly increasing Dairy Powders' bulk densities.

220 Cone Mill Cut-Away



Approx. two dozen Kek Cone Mills of this type have been supplied to a major Dairy Powder manufacturer.

### 3. Fluid Bed Drying

#### Dairy Protein (Casein)

Casein is a high-quality dairy protein derived from skim milk. The casein curd is separated from the whey, washed, and dried, mostly using Fluid Bed Dryers.

After cooling and ageing, the curds are milled into powdered Casein using Kek Universal Mills. Producing curds is the basic technique used to make most cheeses.

The picture below shows a Vibrating Fluid Dryer typically used for drying granular Dairy Protein.



## Milling of Dairy Proteins

A Kek Universal Mill fitted with Turbine & Screen typically used for milling high quality Dairy Proteins is shown below.



Shown below is a PPS 7CMT mill and the mill's interior, depicting the rotor and classifier, supplied for milling Lactose.



## Caseinates

The water-soluble derivatives of acid caseins, produced by reaction with alkalis, are called caseinates. These are finer than Caseins and are used in the manufacture of Creamers and similar fine dairy powders.

Typically, Caseinates are milled by Kek Universal Mills fitted with Pinned Disc grinding media as shown below.



## Lactose Powders

Lactose is a simple carbohydrate found in milk. Another name for it is "milk sugar." It is a "reducing sugar" which means it reacts with amino acids at high temperatures. Spray dried lactose and anhydrous lactose are both milled using Kek Universal Mill, however, more often the choice today is a Kek PPS Classifier Mill.



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