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Application of fluidization in drying, Batch fluidization, Fluidized bed dryers

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Outline

- Introduction

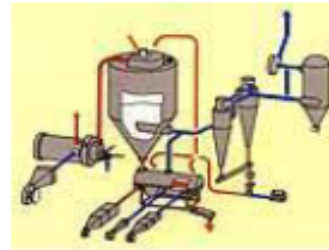
Fluid bed processing involves drying, cooling, agglomeration, granulation, and coating of particulate materials. It is ideal for a wide range of both heat sensitive and non-heat sensitive products. Uniform processing conditions are achieved by passing a gas (usually air) through a product layer under controlled velocity conditions to create a fluidized state. In fluid bed drying, the fluidization gas supplies heat, but the gas flow need to be the only source.



Application :

Conventional Two-Stage Dryer

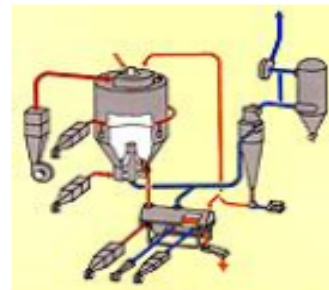
Powder discharged from the drying chamber can be further dried and cooled in a vibrating fluid bed, Vibro-Fluidizer. This two-stage drying concept achieves better overall heat economy and is suitable for many food and dairy products. When non-agglomerated powders of non-fat products are dried, a pneumatic transport system can replace the fluid bed.



A spray dryer layout featuring either a rotary atomizer or spray nozzle atomizer.

Compact Dryer

Atomization is created by either a rotary atomizer or spray nozzle atomizer. The location of the fluid bed within the drying chamber permits drying to be achieved at lower temperature levels resulting in higher thermal efficiencies and cooler conditions for powder handling. The plant can be equipped with pneumatic transport system for many powders or with an external vibrating fluid bed for agglomerated powders.



A space saving spray dryer with integrated fluid bed



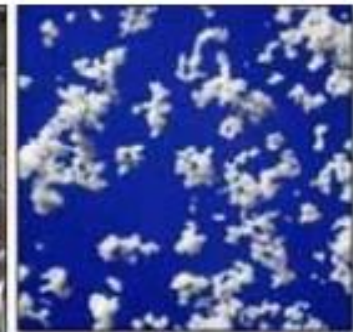
. Fluidized Spray Dryer - FSD

Agglomerated powders are obtained in systems based upon the integrated fluid bed or belt and a multi-stage concept where moist powder, produced during the first drying stage, forms agglomerates, which are after-dried and cooled in the following stages.

Fluidized Spray Dryer / Multi-Stage Dryer

The Fluidized Spray Dryer and the Multi Stage Dryer combine spray drying and fluid bed drying technologies and offer excellent product flexibility, thermal efficiency.

Pressure nozzles or a rotary atomizer spray the feed down towards the fluid bed where agglomeration incorporating finer, recycled material takes place. Exhaust air outlet is let through the roof



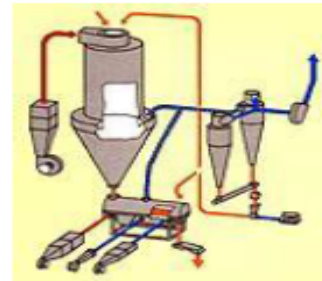
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Skimmed Milk

Microphoto: Skimmed Milk



Tall Form Dryer (TFD)

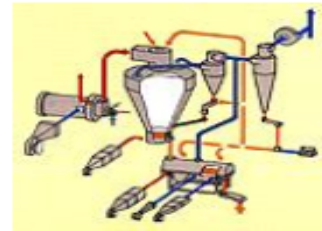
The atomized droplets dry while gently falling down the tower. Further drying and cooling are carried out in a vibrating fluid bed located under the tower. The tall form dryer is suited for both non-fat and fat-containing products, producing non-agglomerated and agglomerated free-flowing powders.



A tower spray dryer with a top mounted nozzle assembly featuring a fines return capability.

Multi-Stage Dryer (MSD)

The spray is created by a spray nozzle atomizer. Operational flexibility enables production of a wide range of physical properties. The process produces non-dusty, free flowing agglomerated powders with high flavor retention. It operates with low outlet-temperatures, achieving high thermal efficiency. Dry ingredients for additional flavor or nutrient fortification can be added within the system to further promote capabilities and improve formulation efficiencies. This design concept is successful for drying high fats, hygroscopic, and sticky products that are difficult to handle in more conventional designs.

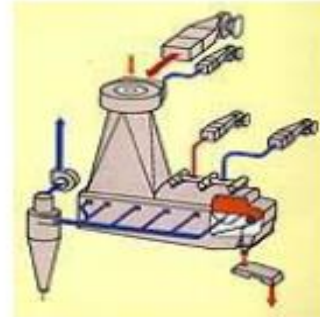


A spray dryer with integrated fluid bed.



FILTERMAT Dryer

The FILTERMAT Spray Dryer is frequently used in food and dairy applications. It operates at a low outlet temperature, achieving high thermal efficiency. It is the recommended system for drying high fat, sugar-based, hydrolyzed, and fermented products.





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Thank you