anhydro
AN SPX BRAND

Spray Drying for the Dairy Industry

SPX®

A question of accuracy, efficiency and flexibility

Spray drying is a continuous process which converts almost any pumpable liquid into a free flowing powder. The liquid, which can be pre-heated in order to reduce energy consumption in the drying process itself, is sprayed via an atomizer into a drying chamber in which it is evaporated. The solids content is further processed in an integrated and/or external fluid bed.

Spray drying is a highly cost-effective method of obtaining powder from heat-sensitive liquids such as milk and whey while retaining valuable nutrients, aromas and flavours.

Critical customer demands

Plant solutions for dairies looking for long-term competitive leadership and profitability need to meet a long line of decisive demands. These include:

- Constant product quality and uniformity with consistent powder moisture content and particle size distribution.
- High yield at lowest possible cost.
- The ability to utilize the same plant for a number of different applications.
- Traceability and compliance with food regulations.
- New product development with short time to market.

SPX delivers

Anhydro spray drying plants are available in a wide range of sizes and configurations. All are based on experience gained from long-term partnerships with dairies all over the world in order to provide competitive solutions for critical demands:

- Total control over a wide range of parameters such as moisture content, particle structure, particle size and distribution, solubility, mixability and wettability, and retention of natural aromas and flavours.
- Energy-efficient components, continuous and rapid drying, ease of operation and process automation deliver maximum process yield at the lowest possible cost.
- Plant design based on experience with many different applications ensures versatility for a variety of applications.
- Top-quality and reliable components for prolonged service life together with efficient and straightforward CIP (cleaning-in-place) mean maximum uptime.
- Automated process control enables end-to-end traceability in compliance with contemporary food standards and regulations.

Atomization and Drying

Anhydro Atomizers

SPX offers two basic types of atomizers which disperse feed liquid into the hot air in the drying chamber:

- Centrifugal atomizers which accelerate and atomize the liquid feed using centrifugal force in a spinning disk. Suitable for most dairy applications.
- Nozzle atomizers that force the liquid feed through a nozzle under high pressure or using compressed air. Nozzle atomization is used in particular when a coarse powder with narrow particle size distribution is required.

Anhydro Spray Dryers

Two drying principles are relevant for the dairy industry. The Anhydro Conical Spray Dryer (CSD) with air extraction at the base of the chamber, and the Anhydro Triple-A Dryer with air extraction at the top of the chamber. Each type offers the following options:

- Single-stage spray dryers with product outlet at the base.
- Two-stage spray dryers sending product to an external fluid bed dryer and/or cooler.
- Multi-stage spray dryers sending product to an integrated fluid bed, and then into an external fluid bed dryer and/or cooler.

Recirculation of fines

Fines are led back from the cyclones and/or bag filters to the atomization zone for agglomeration.

Gentle and Efficient Finishing

Temperature and residence time in the spray-drying chamber are important parameters affecting powder consistency and the retention of nutrients, flavours, and aromas.

After-drying of powder is typically used for heat-sensitive products and for obtaining a free-flowing powder.

Two- or three-stage drying using fluid beds

An integrated or external fluid bed can be used for after-drying and cooling of powder leaving the drying chamber with relatively high moisture content. Use of a fluid bed enables adjustment of process parameters in order to achieve a superior overall drying economy and powder quality. An external fluid bed is also ideal for other kinds of powder treatment such as mixing, agglomeration, dust binding, and instantizing.

Additional drying using one or more Anhydro fluid beds adds a number of advantages compared to single-stage spray drying:

- Energy savings due to a high temperature difference in the dryer.
- Improved product quality, in particular in heat-sensitive products, due to a more gentle drying process.
- Improved agglomeration due to the relatively high moisture content of powder entering the fluid bed.

- Higher powder bulk density and lower air content due to lower drying temperature.
- Lower powder loss due to reduced powder content in the air.

Rewet agglomeration

Anhydro fluid beds are also used for rewet agglomeration for the production of coarse and stable agglomerates as well as adding atomized additives. Typical examples are the production of instant skim-milk and whole milk powders. Agglomeration results in better free-flowing properties, less dust, and improved solubility and wettability.

Optimized Yield and Efficiency

Separation of powder from the hot air leaving the drying chamber increases yield by limiting powder losses, and ensures compliance with environmental legislation by reducing emissions. Efficient heat recovery is also a key factor in plant economy.

Cyclones

Powder from the drying chamber is fed to two or more cyclones for primary separation from the drying air. With separation efficiency in excess of 99.5 per cent, cyclones ensure minimal powder loss as well as emissions well within the limits of environmental regulations. Further cleaning of the drying air can be achieved using a bag filter, or a wet scrubber system.

Bag filters

Anhydro CIP-cleanable bag filters to replace cyclones enable lower pressure loss and increased energy savings. The filter materials can handle relatively high air outlet temperatures, and the automatic cleaning system ensures a high and constant separation efficiency.

Heat recovery

SPX can offer a number of heat recovery systems including conventional heat recovery system from air exhaust to air inlet.

Today more and more systems are utilizing wasted energies. Many of the systems like dehumidification system use heat pumps of different levels to optimize energy utilization and energy cost.

Each heat recovery system will be tailor made to the actual purpose depending on products, capabilities, and energy cost levels for different energy sources, etc. Normally it is today possible to reduce energy cost by 10 - 30% compared with traditional drying systems.

Automated process control is essential in order to optimize key process settings such as feed rate, temperature, pressure, residence time, particle size, moisture content, bulk density, etc.

Anhydro spray drying plant is controlled from a central instrument panel, providing the operator with an end-to-end overview of all production parameters. Microprocessor-based automation systems also enable plant performance optimization, rapid troubleshooting, and real-time recording of critical process data providing complete traceability. Process data can also be passed on to a local network or even to a remote computer via a dedicated dial-up line or the Internet.

Customer focus

SPX can assist in designing complete spray drying plant solutions and optimizing process parameters as well as plant maintenance and spare parts services.

A service and maintenance agreement with SPX also ensures maximum plant uptime and timely spare parts deliveries as well as the ability to adopt fixed service budgets

Test center

SPX's state-of-the-art test facility in Denmark enables customers to perform confidential product development and trials together with SPX experts. Small plants are also available on a rental basis for in-house laboratory trials.

Please visit
our website at
www.spxft.com
for more information

SPX Flow Technology provides a full range of Anhydro Evaporation and Drying equipment for the global dairy, food and beverage, chemical, healthcare and pharmaceutical industries. Focusing on flexibility and attentiveness to individual customer needs, SPX enables excellence at every point along the value chain as part of our commitment to our customers´ success.

SPX acts as a strategic development partner for leading manufacturers all over the world. Through close collaboration with our customers, we promote the development of innovative concepts and optimization of existing processes, enabling customers to introduce new products into the market as quickly and as cost effectively as possible.

SPX®
WHERE IDEAS MEET INDUSTRY

SPX Flow Technology Danmark A/S
7 Oestmarken
DK-2860 Soeborg
Denmark
Phone +45 7027 8222 Fax: +45 7027 8223
www.spxft.com

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