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INTRODUCTION TO SPX FLOW TECHNOLOGY

VISION AND COMMITMENT
SPX’s Flow Technology segment designs, manufactures and markets process engineering and automation solutions to the dairy, food, beverage, marine, pharmaceutical and personal care industries through its global operations.

We are committed to helping our customers all over the world to improve the performance and profitability of their manufacturing plant and processes. We achieve this by offering a wide range of products and solutions from engineered components to design of complete process plants supported by world-leading applications and development expertise.

We continue to help our customers optimize the performance and profitability of their plant throughout its service life with support services tailored to their individual needs through a coordinated customer service and spare parts network.

CUSTOMER FOCUS
SPX Flow Technology Danmark A/S is an international engineering company with a consistent goal to provide our customers with the optimal processing technology and the highest plant performance standards. We have specialized in supplying the optimal design and engineering with respect to production performance, flexibility, energy efficiency and environmental protection. SPX offers a wide range of Anhydro drying and evaporation technologies for handling numerous applications that give high-quality end products in the most efficient and economical way.
Through its Anhydro and e&e brands, SPX offers a range of drying technologies that meet the needs of wide-ranging applications and industries. It has some of the most in-depth expertise in drying technology and works closely with customers to ensure they get the best from their process in terms of efficiency and sustainability along with the desired quality from their end products.

Many customers choose SPX because of its proven capability to provide high quality, complete solutions. SPX drying technologies are designed to preserve and control product qualities and characteristics with innovative technologies which ensure reliable operation and increased process efficiency. SPX can supply standalone systems or incorporate its drying technologies into complete process lines including separation, extraction, filtration, mixing, homogenising, heat treatment, evaporation and agglomeration. It has vast expertise in the production of many products spanning industries including dairy, food and beverage, pharmaceutical and chemicals.

**SPRAY DRYERS**

The SPX Anhydro product range offers the very latest in spray and fluid bed drying technology. They cover small scale and large scale industrial plant applications and come with particular expertise for the drying of products in the dairy industry including milk powders, milk protein concentrates (MPC), whey protein concentrates (WPC), caseinates, probiotic powders whole milk powder with high free fat content, baby formula, heat classified milk powders and yogurt powders. The ranges include conical spray dryers, tall form dryers, spray bed dryers and fluid bed dryers.

Spray dryers have many advantages including easy operation with continuous and rapid drying of a compound. Furthermore, their simplicity does not require complicated automation systems, clean in place (CIP) is straightforward and their compact design has a relatively small installation footprint. They are known for their reliability, good drying economy and predictable scale-up. Relatively low installation and efficient ongoing operational costs make them appealing in many applications.

The spray bed dryer is designed to dry and agglomerate heat-sensitive materials or to condition powders in areas such as lecithination. Lecithination takes place in an external fluid bed divided in several drying/cooling zones. The plant offers high flexibility and reliability for the drying of products with high fat or lactose content. In an application for yogurt powder, for example, (which is very hygroscopic because of its high lactic acid content) the chamber within the SPX spray bed dryer is kept clean using an air broom. In areas such as the drying of very low fat dairy products, the feed nozzle on the dryer can also be replaced by two or more nozzles to atomize the product and create agglomerates.

SPX spray bed dryers can be provided with a nozzle or centrifugal atomizer and air broom for the production of probiotic powders. Such powders are normally defined by taste and the content of living bacteria they contain and, to ensure maximum...
living bacteria in the final product, the powder temperature is controlled to be no more than 55-60°C. These versatile dryers are also suitable for the production of products such as whole milk powder with more than 80% free fat content. For this, application cream is heated after the feed tank to avoid lumping in the feed system and atomised on a central nozzle. Skimmed milk concentrate is atomized on the peripheral nozzles of the dryer. Spray bed dryers are less, however, suitable for non-agglomerated products or for those requiring a high bulk density as the top air outlet leads fines to the atomiser zone where they are agglomerated.

Also within the Anhydro range are conical spray dryers and tall form dryers. Conical spray dryers can produce agglomerated or non-agglomerated product and are good for high bulk density and high fat products. Tall form dryers give a longer, gentler drying process within their large chambers enabling the creation of sufficient high solids and bulk density, making them ideal for high protein products such as MPC, WPC and caseinates.

SPX fluid bed dryers can be used in continuous or batch processes and incorporate drying, cooling, agglomeration, granulation and coating of particulate materials. The technology provides excellent thermal transfer and mixing efficiency while ensuring uniform processing conditions for consistent quality. They are commonly used as a second stage for drying of milk powders and the process is good for retaining aromas and flavours as well as preserving proteins, fats, carbohydrates, vitamins, and minerals within the product. Fluid beds are often used in combination with spray drying as an integrated fluid bed or as a separate external fluid bed to improve product quality and provide a more efficient drying operation.

SPX spray dryers use technologies which reduce deposits within the system, enabling longer running times and higher productivity. They are designed for low exhaust powder losses and maximised yield at the lowest possible cost while providing superior end product quality. Low energy consumption and CIP capability further reduce ongoing running costs. They are versatile solutions which provide process flexibility and enable quick product changes, with a single plant capable of running multiple applications.
The World of Spray Drying Technologies

**VACUUM AND FREEZE DRYING**
The SPX e&e brand provides complete solutions from raw material extraction to final granulate or powder product. It serves industries including food and beverage and offers leading technology for vacuum and freeze drying of liquids and solids including vacuum belt dryers, vacuum freeze belt dryers, batch and continuous tray dryers. SPX is a market leader in these areas and has provided two of the largest vacuum belt dryers ever installed for processing instant malt products. Each one covers an area of 250 m² with a length of 18m and 45 ton weight. Depending on the product being produced, the dryers can handle a product in-flow of 9000 tons per year. SPX has also supplied one of the largest vacuum freeze belt dryer for the production of instant coffee which provides a product output of 2000 tons per year, is 21 m long and weighs 50 tons. This large system was fully tested at an SPX test centre and delivered in one complete piece for installation, ensuring a smooth, reliable start-up. e&e solutions by SPX offer consistent, high performance and undergo extensive testing prior to shipment, including pressure testing, vacuum testing and a thorough examination of full functionality of all components.

**FREEZE DRYING**
SPX e&e freeze drying plants are used in the food and pharmaceutical industries to dry frozen granulates or liquid concentrates. They use high vacuum technology to provide exceptionally gentle drying with process steps including foaming, freezing, granulation, sieving, sublimation and ice condensation.

Vacuum freeze belt drying offers advantages over tray freeze drying systems with lower initial investment and operational costs. The belt drying technology does not require tray handling, transportation, washing or cooling of trays, resulting in greater operational and process efficiencies.

**VACUUM BELT DRYING**
SPX e&e vacuum belt drying plants provide gentle, continuous drying of liquid or solid products. The systems provide contact heating from the bottom with radiation heating from above and the use of a high vacuum enables very low water evaporation temperatures. This ensures short drying times while creating a very gentle treatment which preserves product characteristics such as aroma and colour. There is no oxidation of the product and bulk density along with generation of colour and roasted aroma from the Maillard reaction can also be controlled. Furthermore, the system is completely closed and, if required, can provide continuous discharge of dried product into clean room conditions.

**TRAY DRYERS**
SPX also provides e&e batch and continuous tray dryers for vacuum and freeze drying. These can be supplied from 3 m² to 500 m² of tray surface with 6 to 1400 trays per dryer. They are widely used in food and pharmaceutical applications in applications to dry products such as fruits, vegetables, coffee and tea.
WORKING WITH SPX

SPX works in partnership with their customers to ensure they receive the exact requirements from their process. Whether it is the supply of standard and customised drying products or complete process lines integrating multiple technologies to produce efficient, high performance solutions, SPX has vast knowledge and experience across many drying technologies and applications, supported by a programme of continued research and development driving its goal to deliver the best, efficient, sustainable solutions in the market place.

Complementing the leading technology and experts, is the SPX Innovation Center in Søborg, Denmark, where process and product development can be carried out with customers supported by SPX technology experts. The SPX test centre in Germany will soon be equipped with a new drying plant offering even more facilities to benefit customers with the newest technologies including special dosing systems, belt freeze and vacuum drying, tray freeze and vacuum drying and flexible contact and radiation heating. Camera systems and sensors incorporated within the system will assist with product monitoring and optimised product development. These centres enable rapid product development, optimisation of the process and reduce the time required to meet production goals.

SUMMARY

The selection of the best process drying technology is, of course, dependent on the properties of the feed product and the desired characteristics of the end product. SPX offers the complete scope of spray, vacuum and freeze drying technology and all dryers are designed and engineered to provide total control over the process for uniform product quality while offering energy and process efficiency. Systems can be designed and customised to specific customer requirements for individual end product characteristics.

SPX works closely with its customers to help in designing complete, optimised, drying plant solutions as well as total turnkey process lines. Innovative design and continuous technological development deliver real customer benefit with optimised, sustainable, high performance solutions across many applications and industries.