BHS-AVA Case History: Continuous Filtration, Cake Washing and Final Drying

Introduction

An international pharmaceutical company extracts phospholipids from egg yolk and prepares the final product as an additive for pet food. The company optimized the process with technology solutions from BHS and AVA: The BHS continuous vacuum belt filter is followed by the AVA continuous horizontal dryer in a full GMP installation.

Process Description

Egg yolk is a well-suited source of phospholipids. In the existing process, the ethanol slurry was mixed in various reslurry tanks for dilution washing and then manual filtration. BHS and AVA analyzed the process and recommended the BHS continuous-indexing vacuum belt filter followed by the AVA continuous horizontal dryer in a full GMP installation.

BHS Continuous-Indexing Vacuum Belt Filter

The BHS Continuous-Indexing Vacuum Belt Filter provides for vacuum filtration, cake washing and dewatering of the cake. The technology is based upon fixed vacuum trays, continuously feeding slurry system and indexing or step-wise movement of the filter media. In practical terms, the operational features of the Belt Filter can be viewed as a series of Buchner funnels.

For the process operation, due to the stepwise operation of the belt, washing and dewatering efficiencies are maximized with the stopped belt and the mechanism of “plug-flow” for gases and liquids. Finally, the fixed trays allow for the mother liquor and the wash filtrates to be recovered individually and recirculated/recovered/reused for a more efficient operation. The client installed the fully enclosed and pressure-tight unit of 2.25 m2 of filter area for the egg yolk powder and ethanol slurry. The BHS filter is validated for the pharmaceutical production and has increased the yield of the phospholipids.

AVA Continuous Horizontal Dryer

The client dries the filter cake from the belt filter into egg yolk powder with a residual moisture content of 10 percent. AVA developed the suitable continuous drying process for this purpose and supplied a 1,700 liter continuous dryer. The egg yolk powder is transported with a humidity of 60 to 65 percent from the belt filter to the dryer. The optimized transfer moisture in the integrated filtration and drying system enables maximum efficiency with regard to energy consumption, process duration and machine sizes. The dryer operates at a throughput of 485 kg / h.

The filter cake comes into direct contact with the shaft and the jacket of the horizontal dryer. Both the shaft and the double jacket are heated with steam. The double jacket is divided into two heating zones to gently heat the product. The target temperature is between 70 and 80 degrees. Ethanol evaporates and is passed through a vapor filter to the condensation system. There, the ethanol is collected to reuse it for the process.

The integrated feeder continuously transports the yolk powder through the dryer to discharge with residual moisture less than the 10 percent. The blades are arranged so that there is a homogeneous mixing and no dead spaces. The dried product is finally discharged through a manually adjustable weir into a shaft. There, the powder is crushed and then pneumatically transported into a double cooling screw, where it is cooled to 25 degrees. The product is finally filled in bulk containers for further processing and distribution nutrient-rich basic component in the animal feed industry.

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BHS Vacuum Belt Filter
Pressure and Vapor Tight
Vacuum Belt Filter

AVA Continuous Horizontal Vacuum Dryer
Model HTK-T-1700
Steam-heated shaft and double-jacket

BHS-Sonthofen Inc. and AVA-GmbH are wholly-owned subsidiaries of BHS-Sonthofen GmbH and part of the BHS group of companies. The BHS filtration technologies provide for thin-cake (3 mm - 25 mm) filtration, cake washing and dewatering based upon pressure or vacuum, for batch or continuous operations from high solids slurries (up to 50% solids) to clarification applications with solids to 1% and less (trace amounts). The AVA technologies provide for turbulent mixing, reacting and drying of wet cakes as well as powders and process slurries. The vertical and horizontal technologies are vacuum or atmospheric, batch and continuous, for final drying to "bone-dry" powders.

Filtration and drying tests are conducted on-site or in the BHS test labs in Charlotte, North Carolina or AVA test center in Herrsching (Munich), Germany. The BHS drying test center will be available in 3Q 2019. For further information, please contact Barry A. Perlmutter, President & Managing Director of BHS-Sonthofen Inc. at 704.845.1190 or via e-mail at info@bhs-filtration.com. Information can also be found at www.bhs-filtration.com or https://www.ava-huep.com/en/.