

Bühler Processing Expertise Drives

Aquafeed Production in China

Introducing a new drying solution for processing up to 14,000 Kilos per hour

By Justin Hamm, Applications Engineer, Bühler Aeroglide

China continues to drive demand and aquafeed development in the Asia-Pacific region, based on supplying the nation's growing domestic interest in seafood. To meet demand and address sustainability, aquafeed processors need alternative ingredients to replace traditional fishmeal. High quality microbial proteins, such as soy based products, and new insect formulas are being researched for sustainable production. The combined interaction of processing ingredients is crucial in feed production to ensure the ideal formulation can deliver a complete diet for fish and crustaceans. Gentle processing can retain the exact water solubility important for fish health and digestion, while uniform drying with the right moisture targets can ensure particular floating and sinking characteristics.



No one understands these processing nuances better than Bühler. For many years, Bühler has engineered full processing lines for customers in China, starting with mixing, grinding, extrusion and shaping, and followed by drying and pellet treatment. Nutreco and the Haid Group are two of its multi-national customers.

Nutreco extruded fish feeds

Nutreco processors use Bühler's proven extrusion process via a twin screw extruder to manufacture floating and sinking fish feed. Production is essentially a complex cooking process, with homogenous mixing that achieves consistency. Here, starch-containing components are decomposed, and proteins are denatured. Together with other ingredients a hydrophil, yet waterstable, matrix is created. The required heat in the preconditioner is added in the form of direct steam injection. The blend is then transferred to a feeder which gets metered to an extruder.

"Bühler helps producers understand how processing affects the properties of a formulation, as well as how the ingredients in the formulation affect the process," said Henry Han with Bühler Changzhou Machinery Co. Ltd., which is located in an eastern coastal province of China. "Being able to calculate and control the results of the process ensures product quality, optimal production efficiency, and minimal waste or rework."

In the extruder, the blend is preheated to approximately 95°C. It is further heated by mechanical processing, before temperatures ranging from 120° to 140°C are finally achieved. Part of the extrusion process uses a density control system that allows the steam pressure of the hot dough mass to be controlled while the mass is still inside the extruder. This enables the sinking or floating

characteristics to be controlled across a wide range without compromising on the cooking degree. The energy released can be returned to the conditioning stage with almost zero emissions.

"Bühler provides both the technology and the expertise China processors need, helping them understand what's happening chemically and physically inside the extruder barrel," said Han.

In recent years, Nutreco has reduced its use of fishmeal in salmon feed with research and technology, recognizing other ingredients as carriers of nutritional qualities. Reducing fishmeal dependency has helped the company find new profitability, quality and sustainability in other sources.

Meanwhile, the Haid Group, headquartered in the Guangdong Province, has more than 60 factories with Bühler installations. Haid is working to promote agriculture by applying scientific and technological advances that can help change the rural status of its province and improve working conditions, bringing in higher incomes for fish farmers. In the past 10 years, Bühler has worked with Haid to expand production to include prawn, chicken and duck feed, while aquatic premix continues to be its core business. Haid is one of the first customers to use Bühler's new SmartDry FEED technology.

Introducing the SmartDry FEED

"The SmartDry FEED is a response to market demand for a dryer that provides consistently high product quality, energy efficient operation, and many of our latest hygienic design advances in food safety," said Dustin O'Farrell, Process Engineering Manager for Bühler Aeroglide, Asia.

Feed manufacturers who process up to 14,000 kilograms per hour, depending on their process parameters, now have a

dryer engineered for a smarter use of energy with a clean, safe operation that reflects the most recent advances from Bühler's industry collaborations. The SmartDry FEED brings Bühler's trademark quality, local support and reputation for consistently efficient drying of pellets.

Haid chose Bühler Aeroglide because of the dryer's performance and energy consumption. The SmartDry FEED makes optimal use of energy with recirculated air and a managed exhaust system. Fully insulated and independently-controlled process modules keep the heated air within the dryer while high efficiency drive motors and direct drive fans help to ensure energy costs are kept in check.

"Being able to easily switch product formulas was very important, with no cross contamination in product changeover," said O'Farrell.

For a clean, safe operation, the SmartDry FEED has unique, food safe bedplate style conveyors, eliminating the high-maintenance mesh style belts. All product contact areas are constructed from 304 stainless steel and specifically designed to give the processor complete access for effective cleaning. Plus, the dryer can easily achieve the final product moisture so that all Haid products dry uniformly with optimum product characteristics and product weight requirements.

The SmartDry FEED ensures product quality and uniformity by using a two-pass alternating plenum with up and down airflow configurations. The process modules are set 180 degrees to each other so that heated airflow is distributed through the drying zones from both sides of the product conveyor. For extruded pellet applications, a pre-dryer with optional heat coil, all up airflow, and vibratory technology, can pre-dry product to provide non-sticky pellets for the product bed. After drying, an integrated

cooler uses ambient air to stop the drying process and control the product discharge temperature.

“Haid has been successful in achieving less than 180 kg steam per ton of product while drying floating feed applications, and less than 300 kg steam per ton of product in high density/moisture sinking feed applications,” said O’Farrell.

In general, Bühler expects to achieve +/- 1.0% for final moisture within a 9-point composite sample of the product bed profile. With most feeds, process engineers can help customers reach +/- 0.7%. With an OSP upgrade (oscillating spout programmable) to the AeroFeed feeder, Bühler has been able to achieve a variance as low +/- 0.5% in applications. An OSP upgrade is a technological advanced feature that helps processors achieve improvements in the bed depth. It allows the operator to program the feeder, via the dryer control system, with variable oscillating speeds so that product can evenly

load across the bed. At the edges, where peaks tend to form, the feeder can be programmed to travel at a faster speed to eliminate the overlap effect of the feeder changing direction. The speed can then be reduced when the oscillator moves into the middle of the bed ensuring the product is a consistent depth across the entire bed.

When drying aquafeed, moisture affects feed density, or the floating and sinking characteristics. When a processor needs to overdry to compensate for those higher moisture areas, the overall functionality of the feed is reduced. Additionally, overdrying can mean bulk weights and saleable yields are reduced, which means that processors could literally be sending valuable moisture, and profit, right out the dryer exhaust. If the bed load is even, air flow will be even and the product will dry uniformly. This yields a much more consistent

product, as well as significant gains in production.

Pellet processing is one thing, but being able to train and service customers from anywhere in the world after an equipment installation is a core Bühler competence. Through the Bühler Group network, customers have access to the largest team of specialized engineers in the world. Cost conscious companies around the world trust Bühler Aeroglide to troubleshoot their drying operations, improve equipment performance, and increase their production.



More information

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