Bühler Pet Food **Solutions.**

Innovations for a **better world.**

BÜHLER

Proven extrusion processes.
Integral element of the production process.

Pet Food processing focuses on the production of feeds for animals with a high emotional value but low economic usefulness. Nonetheless, balancing the components and gentle processing are at the center of the related quality considerations. Extrusion is therefore increasingly proving to be the right tool for modern Pet Food.

A large number of Pet Food products are made by extrusion:

- **Dog and cat foods.**
  Directly extruded and dried, dry or semi-moist. These constitute the biggest market segment.
- **Textured proteins of vegetable and/or animal proteins, extruded and dried.**
  These meat-like semi-finished products, usually rehydrated and used as complete canned feeds, may also be applied in “instant dry menus”. These are prepared with hot water before feeding.
- **Wet-textured products.**
  Wet-textured products are also based on a mixture of vegetable and animal proteins, but include much higher meat addition rates. Typically, they have water contents of 60 to 70%. They are extruded as endless strands and are cut after the extruder and then processed into complete canned feeds.
- **Treats, functional foods, or bites**
  Given to animals to keep them busy.
- **Feed for ornamental fish**
  High-grade complete feeds capable of maintaining the health even of exotic species in aquariums over prolonged periods of time.

Extrusion process.

In the extrusion process, a cooking operation follows the specific processing of the raw materials by blending, mixing and grinding. The goal is essentially to achieve the following effects:

- Modification the starch
- Denaturation of proteins
- Shaping, expansion, texturing
- Improvement of taste

The required heat is mainly added in the form of direct steam during preconditioning to about 95°C. In the extruder, the preheated mass is further heated by friction so that temperatures of about 120 – 160°C are achieved.

The patented “Density Control System” allows the steam pressure of the hot dough mass to be controlled while the mass is still inside the extruder. This enables the bulk density to be controlled across a wide range without compromising the cooking degree. With this system, the removed energy is not wasted, as the heat is fed back to the preconditioner.

Shaping/cutting.

The die hole geometry is crucial in the process, as the hot melt has to be shaped, expanded and cut. A movable cutting device allows the die holes to be controlled and the knives to be exchanged even during the process. Since a considerable volume of moisture is evaporated at this point, hot air addition and a good aspiration system are needed to prevent the extrudates from sticking together. Among other things, using special die holes also allows the production of two-colored products, or the simultaneous production of different shapes and colors.

Drying.

The hot and steaming product very rapidly releases the free surface moisture to the hot air stream. Once the surface has been dried, the drying action is limited by the diffusion rate inside the product, and the air stream can be reduced. Due to these physical conditions, the drying process is diverted into different segments with different temperature profiles. This optimized process allows very fast, gentle, and nondeforming drying to the necessary final moisture content of 8 to 10% even of soft and sticky products.

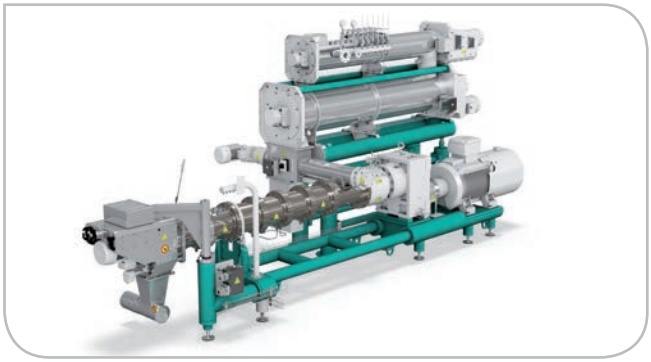
Coating/cooling.

Usually, the dried extrudates are coated while still warm directly after the dryer. During this stage, it is possible to add fats, flavorings, attractants, colors, and even powdered ingredients. Depending on the temperature and the specific surface area of the extrudates, up to 12% liquids can be absorbed in the coating drum and the subsequent cooler.

Core elements in Pet Food production.
The crucial processes for top quality.

PolyTherm - preconditioner.

The preconditioning concept is based on the separation of the overall process into two stages: component mixing and retention to allow cooking. The BCTC preconditioner is available in six sizes ranging from 100 to 1,600 liters capacity, with processing throughputs of 100 to 20,000 kg/h.



Single-Screw Extruder.

The Single-Screw Extruder is a cost-effective tool for cooking and shaping products and the standard solution for Pet Food. The machine is characterized by its adjustable process section, its various drive options, a number of accessories such as water-cooled or electrically heatable barrels, and its ease of operation and automated control system.

PolyTwin Twin-Screw Extruder.

The modular twin-screw extrusion system covers the entire capacity range, from laboratory scale to high-capacity production machines. The process configuration of the machine is carefully matched to the specific application. With this twin-screw technology new ingreedients such as plant based proteins, pulses, vegetables and fresh fish or fresh meat can be used with highest flexibility.

SmartFeed - Aeroglide belt dryer.

The SmartFeed II conveyor dryer features uniform, efficient, and durable drying solutions for Pet Food. The new dual plenum concept provides a superior airflow that results in uniform moisture content and greater saleable yield. Setting the standard for multi-pass, dual plenum conveyor dryers, the new SmartFeed II stands out due to its engineered airflow control throughout the recirculation loop. This unique design provides uniform airflow temperature and velocity distribution across the entire product bed, resulting in extremely consistent product quality.

Focus on final product characteristics.
A variety of shapes and colors.

Direct-expanded kibbles.

Dog and cat foods with moisture contents below 8%.

Multicolored products.

Continuous process for which a patent is pending enable multicolored products to be made using a single extruder.

Fresh meat inclusion.

Meat inclusion up to 25% without any change of the extrusion setup (beside the dosing unit) Higher amounts require additional processing equipment.

Two-colored products.

Products based on the same formulation but which are differently colored and intermingled in a single shape at the end of the extrusion process.

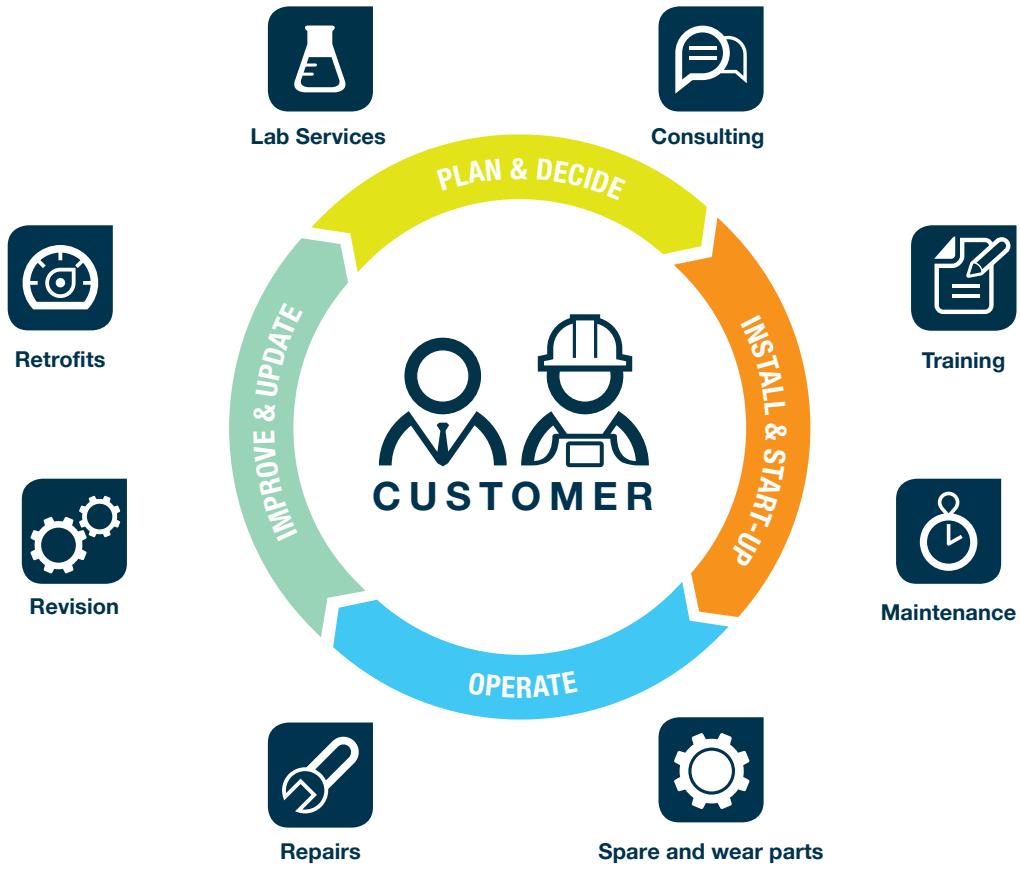
Filled pillows.

Dry or semi-moist. The filling is added at the end of the extrusion process. The filled strands are pinched apart by a downstream separating system.

Semi-moist Pet Food.

Soft dog and cat foods with moisture contents above 13% and a bulk density of 400–600 g/l.

Extensive range of services.
From engineering to training.



Lab Services
The laboratories offer a broad range of analyses and testing of food and technical materials in order to innovate processes and improve equipment for our customers.

Spare and wear parts
Highest standards of reliability apply to original Bühler spare and wear parts. They are perfectly adjusted and ensure performance and production safety.

Training
At Bühler training centers – or at any site worldwide – specially trained experts pass on their hands-on expertise and knowledge to customers' employees.

Revision
Bühler evaluates, over-hauls, adjusts or renews customer installations, including Bühler and non-Bühler machines.

Consulting
Strategic, plant performance, or energy consulting are just some of the consulting services to improve product quality, production proces-ses and energy efficiency.

Repairs
Dedicated to minimizing downtime in the event of an incident: Fast and reliable technical repair service via the Bühler eTicket or the Bühler Helpline – world-wide, 24/7.

Maintenance
Packages are adjusted to fit production cycles to prevent downtime, loss in production efficiency or product quality, ranging from individual services to complete outsourcing of maintenance.

Retrofits
With individual upgrades and conversion kits time-worn Bühler machines will perform to current standards of technology and efficiency.

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