



# Dry Pet Food Processing

Complete processing lines for extruded pet food



# Pet food as never before

Many years of experience in the food sector, customer-tailored development and a constant focus on innovation, allow us to create a new generation of pet food.

## Experience in the food industry

In a market where customers increasingly demand products similar to those for humans, in terms of nutrition, quality and variety, our many years of experience in food extrusion and drying allows us to offer futuristic solutions that set new standards in the market.

## Tailor-made philosophy

We work alongside our customers, supporting them in creating and developing innovative products, helping them define the formulations, forms, consistencies, weights, flavors and colors that best satisfy consumer demands. We share a goal of obtaining innovative and high-quality industrial production based on collaboration that starts with research and ends with the most advanced processing technologies.

## R&D capabilities and pilot plant

Our success comes through constant and thoroughly organized Research & Development activities executed by a team of 30 people, including process technicians, analysts and mechanics. At their disposal is a 22,000 square foot facility equipped with a completely new pilot plant. It can be used to develop new products which can then be analyzed in an on-site lab equipped for chemical, chemical-physical and rheological testing, as well as nutritional/organoleptic analysis.

# Dry pet food applications

The possibility of creating any format to meet the needs of pets of any size, whether complete meals or snacks.



## Kibbles

Thanks to a detailed study of the formulations and formats that satisfy the pet's energy and nutritional needs and what the imagination, kibble is considered the basic food in pet diets. The ingredients and format can vary according to the animal's size, age and state of health.

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## Pillows

Primarily intended as tasty snacks used to reward the pet for positive behavior. Using our extrusion technology, we can combine grains with flavorful and nutritious fillings according to requirements.

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#### Dental sticks

Designed and developed specifically for use in cleaning dogs' teeth. Their unique star shape gets into hard-to-reach areas, protecting the animal's health while also providing nutrition.

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# Dry pet food processing

Technologies and processes developed for manufacturing products for human consumption are now being applied to pet food.



## Ingredient preparation

The solid raw material composed primarily of grain flours, meat flours and nutritional ingredients, is mixed and perfectly dosed in the optimal recipe to meet the quality requirements.

## Cooking extrusion

Our cooking-extruders combine the gentle cooking in the steaming tank with the power and sanitization of heat extrusion to obtain a highly digestible and nutritious product.



## Product processing

Thanks to our technological experience and know-how, we can offer solutions for any type of format, recipe or product – from kibble to various kinds of treats. From cooking technology to ingredient integration, to cutting, transport and drying, to cooling and packaging, we can bring your projects to fruition.

## Drying and cooling

We examine every aspect of the product so the final product has the desired characteristics. Our dryers are designed to reach very high temperatures, while allowing multiple format changes with insignificant or even zero contamination between products. Our coolers are developed to gently moderate product temperature for uniform cooling without impacting the flavor, aroma and quality.





**Ingredient preparation:**  
*Sieving, mixing and storage.*



**Cooking extrusion:**  
*Head of a TT70 cooking extruder installed on a pillows processing line.*



**Product processing:**  
*Detail of a pillows cutter.*



**Drying and cooling:**  
*Dryer for kibbles.*

# Kibbles processing

All sizes and shapes for  
basic diets

## A solution for any format

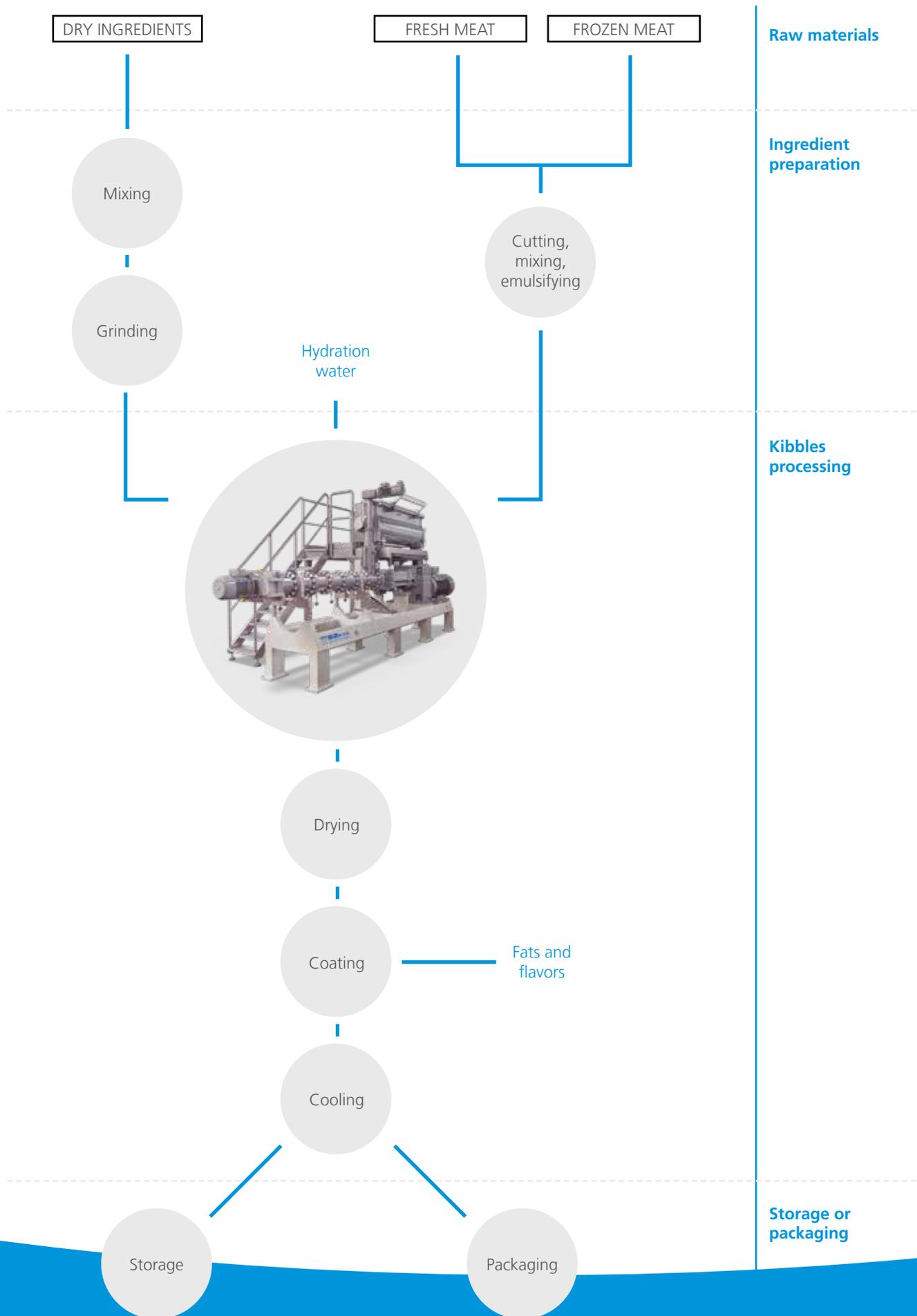
Our dies are designed, engineered and built in house so we can provide a solution to any requirement in terms of product shape.

## A high-quality product from any raw material

Due to our ability to customize the extruder's modular screw configuration along with our technicians' expertise, we can adapt the line characteristics based on the raw materials selected, ultimately producing a high-quality product.

## Durability and ease of maintenance

Our in-depth knowledge of the processes (use of multi-blade cutters) and use of top-quality construction materials (dies made of high-tensile steel) allow long term use and operability of the processing lines.



# Pillows processing

An explosion of flavors in a snack created for humans and perfected for pets.

## Our tradition applied to pet food

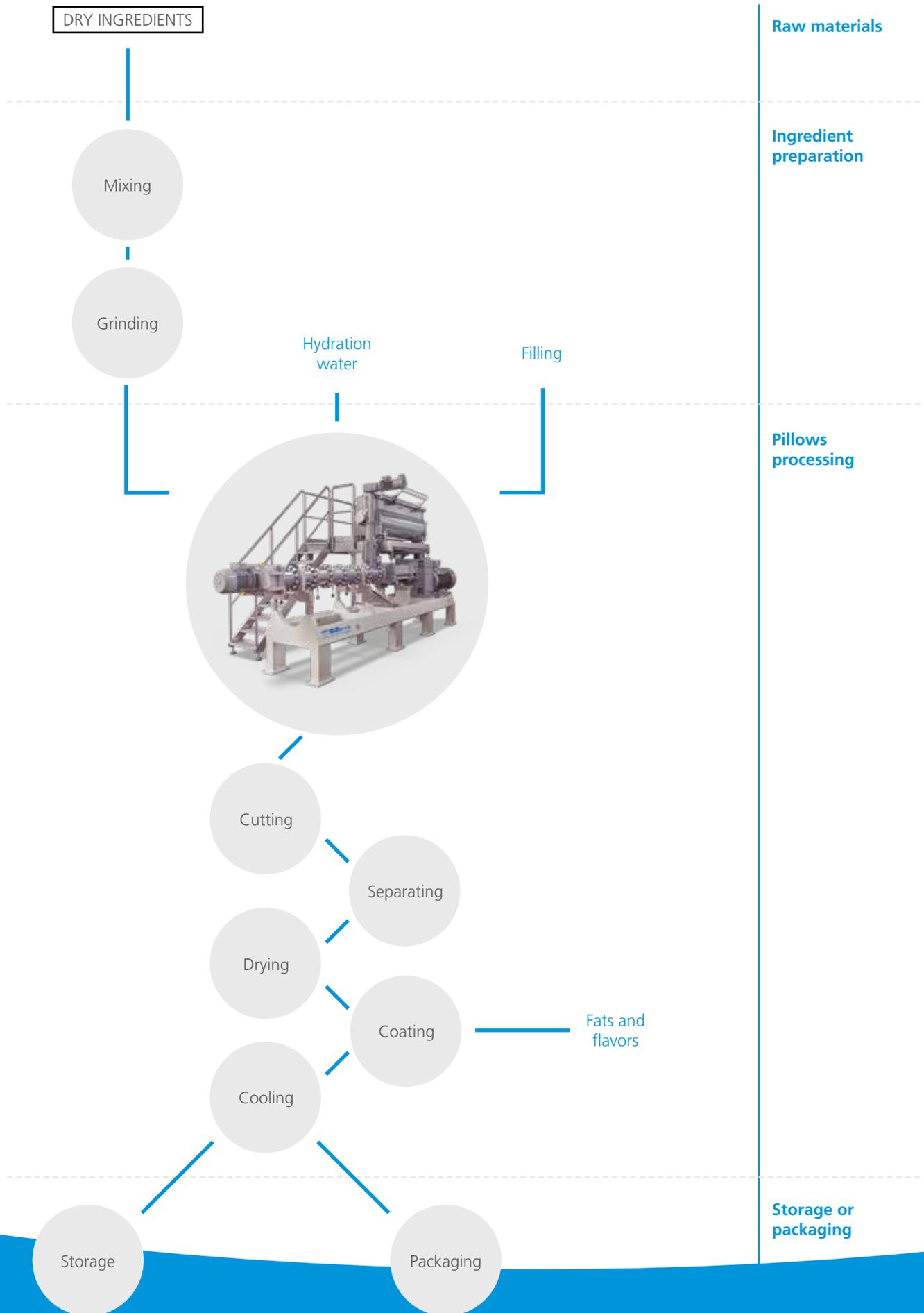
Thanks to years of experience in developing and perfecting technologies for the production of human snack food, we now have high-quality and reliable snack production lines dedicated to pets.

## Precision and high performance

The repeatability of a high-precision product in large quantities is a path and objective we have reached through experience and technological knowledge.

## Our lines feature:

- fixed-pitch rollers to provide constant size;
- very high-speed machinery for high performance and capacity;
- specially designed dedicated pumps for continuous and precise filling dosing.



# Dental sticks processing

Technologies and processes developed for the well-being of pets.

## Perfection beginning at the extrusion phase

Excellent flow management at the cylinder head is based on our experience and technology with long pasta lines. This means we can distribute the product rows in the cutter in an orderly manner, thus improving final quality.

## Cutting precision and uniformity

Our cutter was specially designed and developed for dental stick lines to provide maximum weight and length consistency in the single pieces, thus allowing for consistency of the final product.

## The cooling phase

Developed and specially designed for dental sticks, the cooler gently lowers the temperature of the product, bringing it as close as possible to room temperature, avoiding unpleasant condensates and deterioration of the finished product.

DRY INGREDIENTS

Mixing

Grinding

Fats and additives



Cutting

Cooling

Storage

Packaging

Raw materials

Ingredient preparation

Dental sticks processing

Storage or packaging



**RAW MATERIAL HANDLING SYSTEM**  
Installed on a multipurpose line for extruded dry pet foods.

# Ingredient preparation

We develop the best technologies to enhance ingredients and satisfy any finished product requirement.

## Grain handling

Technology and experience developed in the milling world, allows our flour plants to provide optimal high-precision care and management of raw materials.

From automated mixing systems for raw material, to cleaning and selection machinery, to precise dosing devices for recipes, every step is studied and designed to produce products of the desired quality. Extreme consistency in dosing grain size (even starting from different raw materials) and constant micrometric control after the mixing stage, allow our lines to create a very homogeneous product beginning at extrusion.

## Meat slurry

Synergy and collaboration between GEA technologies allow use of proven machines to prepare meat-based ingredients that are paired with extrusion technologies.

The reference machine in the industry is the GEA CutMaster – it cuts, mixes and emulsifies all different kinds of meat products from coarse to very fine. All processes take place within the same machine and are, therefore, independent from peripheral equipment. The slurry that results from the GEA CutMaster can be injected in the cooking extruder trough a meat slurry pump. This pump is equipped with specially shaped lobes to avoid surging and is fully washable and inspectable for high hygiene.



*GEA CutMaster*



*Meat slurry pump*



## TT70 COOKING EXTRUDER

TT cooking extruder installed on a kibbles production line.

# Extrusion technology

The heart of our manufacturing process: flexibility, speed and durability, serving any product and format.

## Pioneers of extrusion technology: The cooking extruder

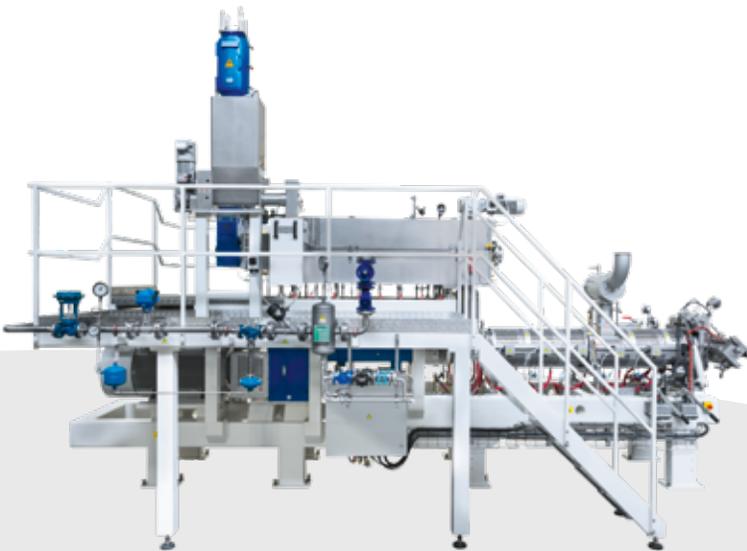
Based on our extensive knowledge of technologies and processes in the food world, our technicians have created extruders able to produce highly digestible and nutritious products.

The steaming tank positioned before the extrusion process pre-cooks the ingredients, thus triggering starch gelatinization and protein denaturation, improving digestibility and avoiding anti-nutritional factors.

The combination of gentle steaming in the tank, followed by heat treatment during the extrusion phase, provides a sanitized product with a high degree of gelatinization.

## Technical characteristics

- Steaming tank for ingredient pre-cooking;
- Double screw made of the highest quality materials for durability and strength;
- Automation system for constant and customized control of all values and processes;
- Solid and quality construction means the system can run for a long time without frequent maintenance;
- Can be equipped with one or two interchangeable heads.



Side view of a TT92 Cooking Extruder

# Cooking extruders

## The TT series

The TT cooking extruder continuously and automatically gelatinizes flours and starches.

After dosing the raw materials, the mixing phase begins, which can be adjusted according to product needs. Next comes extrusion.

The TT extruder is a modular machine with segmented barrels available with different heating and cooling systems. It can be equipped with a feeding port, steam/liquid injection port or venting port (atmospheric or under vacuum according to specific needs).

### Technical characteristics

The co-rotating, fully intermeshing screw assembly is composed of sectional modules with the following functions: forward and backward transport, mixing, feeding of additives, injection of liquids, de-gassing, cooking and forming.

The screw profile allows for a high mechanical working capacity and high torque transmission. The drive system is composed of an AC variable speed drive, a safety clutch and a double cascade gearbox for correct reduction. The thrust bearing system

integrating the gear box and with a forced lubrication circuit is composed of a large thrust bearing on one shaft and a multiple thrust bearing series on the other, for a compact and robust construction.

The extruder can be equipped with a head unit featuring independent temperature control, product pressure device and interchangeable dies with a series of different cutting units based on the production needs of the finished product.

### Control system

The typical control system of the TT extruder features a supervising unit monitoring all extruder functions from dosing to the cutting unit, allowing easy recipe management and displaying all process variables, such as raw materials flows, extrusion torque, specific mechanical energy value, barrel temperatures and die pressure. The supervising system stores the values and allows data export and management with the most commonly used spreadsheet software.



#### TT92-evo:

*The twin extruder with the highest power and range of original products. It is equipped with a completely new ergonomically designed frame that is stable, sturdy and easy to clean.*

Product	<p><b>Kibbles</b></p> 	<p><b>Dental sticks</b></p> 	<p><b>Pillows</b></p> 	Extruder
Max. Line Capacities	<p><b>2,200 lb/h</b> (1,000 kg/h)</p>	<p><b>570 lb/h</b> (250 kg/h)</p>	<p><b>660 lb/h</b> (300 kg/h)</p>	TT 58
	<p><b>5,500 lb/h</b> (2,500 kg/h)</p>	<p><b>880 lb/h</b> (400 kg/h)</p>	<p><b>1,100 lb/h</b> (500 kg/h)</p>	TT 70
	<p><b>9,900 lb/h</b> (4,500 kg/h)</p>	<p><b>1,800 lb/h</b> (800 kg/h)</p>	<p><b>2,200 lb/h</b> (1,000 kg/h)</p>	TT 92
				TT 112



Detail of a TT92 cooking extruder steaming tank and the characteristic paddle shaft.



Detail of the extruder head showing the two extrusion screws characteristic of the TT92.



## DISCHARGE DESCENDER

It feeds product into the silo, from the base to the top,  
without damaging it.

# Storage and handling

Good quality raw materials and finished products need to be protected and stored with utmost care and efficiency.

## Complete systems for raw material and finished product care

We offer complete systems or single machines to transport, dose, clean, rework and store raw materials, pet food and small items.

Advanced technology applied to design and production makes it possible to fine-tune a sophisticated production chain which results in higher quality standards.

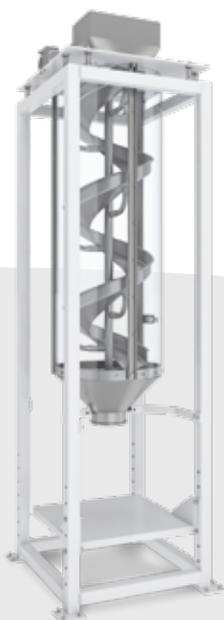
The design and engineering of the systems are developed by highly qualified professionals using the most advanced technologies. The system and its layout are designed in cooperation with the customer to optimize existing resources, equipment and facilities.

## Recipe control and optimization

With our PLC equipped plants, the entire process can be managed from a single control point.

The recipe for every product can be programmed. This includes monitoring the filling levels in the silos, tracking every production batch and fine-tuning the production chain.

In addition to complete automated control of the equipment, these tools provide the customer with critical information that can reduce waste and downtime.



### **DED - Direct discharge descender:**

*It conveys the product directly to the packing plant or other plant, without damaging it.*

# Start to finish solutions for pet food from GEA

GEA has developed a comprehensive range of technologies, equipment and know-how to configure and install solutions for pet food manufacturing plants.

## Pre-crushing & grinding

- GEA BlockCrusher: heavy-duty crusher to break individual or multiple blocks or complete pallet loads of frozen raw materials
- GEA PowerGrind: high capacity grinder for efficient and gentle grinding
- For fresh and frozen products with same set-up



## Mixing

- GEA ProMix: robust, reliable and flexible mixer
- Excellent distribution and absorption of liquids
- Steam injection



## Cutting, mixing & emulsifying

- GEA CutMaster: Cutting, mixing and emulsifying in one step
- Processing different kind of meats products from coarse to very fine
- Easy to clean and maintain
- Steam injection and cooking
- Very versatile



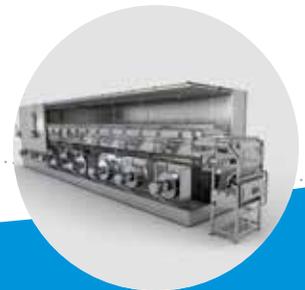
## Forming

- GEA MultiFormer: produces rectangular, round, triangular, irregular and novelty shapes with a flat or 3-dimensional appearance.
- User-friendly operation and cleaning
- Fast product changeover
- Accurate process control



## Freezing

- GEA IQF Tunnel Freezer: designed for hygienic requirements
- High yield and minimum energy consumption
- Modular configuration for perfect integration into your processing line



## Emulsifying

- GEA EcoCut: accurate control over emulsion quality, fineness and temperature
- Cassette mounted double- and triple-knife sets
- Automatic knife adjustment



### Service

- Installation, commissioning, training
- Spare parts, corrective maintenance, preventive maintenance
- Upgrades/modernization/ optimization, predictive maintenance, factory-rebuilt equipment
- Performance contracts, on-site project support, service software products



### Test facilities

- Process development and validation
- Fully scalable test equipment for processing including freezing and freeze drying
- Industry leading know-how, spanning early stage product development through to final process refinement



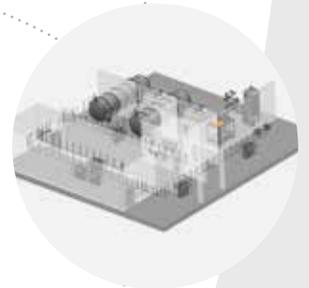
### Dry pet food processing lines

- Tailor-made processing lines
- High capacity and low maintenance cooker extruder
- Technology for the production of any kind of extruded dry pet food



### Process engineering

- Process design and engineering
- Project management
- Plant installation and commissioning



### Packaging

- GEA SmartPacker: vertical form, fill and seal packaging machine
- Consistent high quality of produced packages
- Reliable and smooth film transport
- Quick film reel and bag format exchange



### Freeze drying

- Industrial solutions for efficient freeze drying of raw, cooked meat and mixed products
- Highly efficient RAY freeze driers, allowing products to keep their original properties and uncooked appearance
- RAY pilot plants designed for new product development and scale-up



### Automation & control systems

- Process automation and manufacturing execution system (MES) solutions
- Integrated company-wide network systems with corresponding MES
- Data capture and evaluation





## We live our values.

Excellence • Passion • Integrity • Responsibility • GEA-versity

GEA is one of the largest technology suppliers for food processing and a wide range of other industries. The global group specializes in machinery, plants, as well as process technology and components. GEA provides sustainable solutions for sophisticated production processes in diverse end-user markets and offers a comprehensive service portfolio.

The company is listed on the German MDAX (G1A, WKN 660 200), the STOXX® Europe 600 Index and selected MSCI Global Sustainability Indexes.

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