

Food Ingredients.

Innovative processes satisfying modern needs.



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An immense variety of food ingredients is produced by Bühler extrusion systems around the world. The most important include modified flours and starches, breadcrumbs, value-added byproducts from flour milling, and texturized proteins. Processing of starch- or protein-based raw materials by extrusion creates a wide diversity of functional product properties. The extrusion process is flexible, effective, and economic. The particular advantage of modification by extrusion as compared to chemical starch modification lies in cost-efficient production and declara-

tion in compliance with food laws. The flexibility offered by twin-screw extruders and the process expertise of our technologists reduce all food ingredient applications to one single process flow chart. It comprises the following unit operations: blending & mixing, conditioning, extrusion (cooking & shaping), drying & toasting, grinding, sieving, and storage & packaging. Bühler extrusion technologists configure the individual system components to create the required product properties.



Modified flours and starches

These products, which are also called swelling flours or swelling starch, are especially characterized by their modified water absorption and solubility properties. The viscosity of flour-(starch-)and-water suspensions is adjusted to suit customers' specific needs. Suitable thermal or mechanical energy input into a preconditioner and extruder allows products to be made which are soluble in cold or hot water and which have a wide range of viscosities. Modified flours and starches are applied in the following products:

Bakery products	Water binders, freshness extenders, binders
Sauces, soups	Binders
Meat, fish, sausages	Fillers, adhesion promoters, breadings, binders
Desserts	Firming agents
Instant beverages	Thickeners
Confectionery	Flavor carriers
Baby foods	Bases, calorie carriers
Feeds	Bases in calf rearing
Crude oil production	Lining of boreholes
Textiles	Upgrading of textile threads
Paper	Additives
Building construction	Addition in construction chemicals
Adhesives	Additives



Breadcrumbs

Suitable selection of the extrusion parameters and raw material formulations and appropriate grinding of the extrudates allows the production of breadcrumbs for different uses. If required, it is possible to adjust the texture, pores, color, and particle size distribution of the end product almost at will. Applications of extruded breadcrumbs:

Meat, fish	Breadings
Fresh pasta	Fillings, binders in fillings
Convenience food	Breadings, fillings



Texturized proteins

Vegetable or animal proteins can be premixed with additional ingredients such as flours, food colorants, flavorings, minerals, or emulsifiers and then be conditioned and extruded. Inside the extruder, the molecular structure of the proteins is modified. Fibers and cross-linked structures are created. Depending on the specific configuration of the extruder, foamy or compact textures will be produced with longer or shorter fibers. The extrusion process involves either a low water addition rate (dry textured products) or a high water addition rate (wet textured products).

Meat substitutes	Sausages, fillings, sauces, soups
Convenience food	Meat analogues

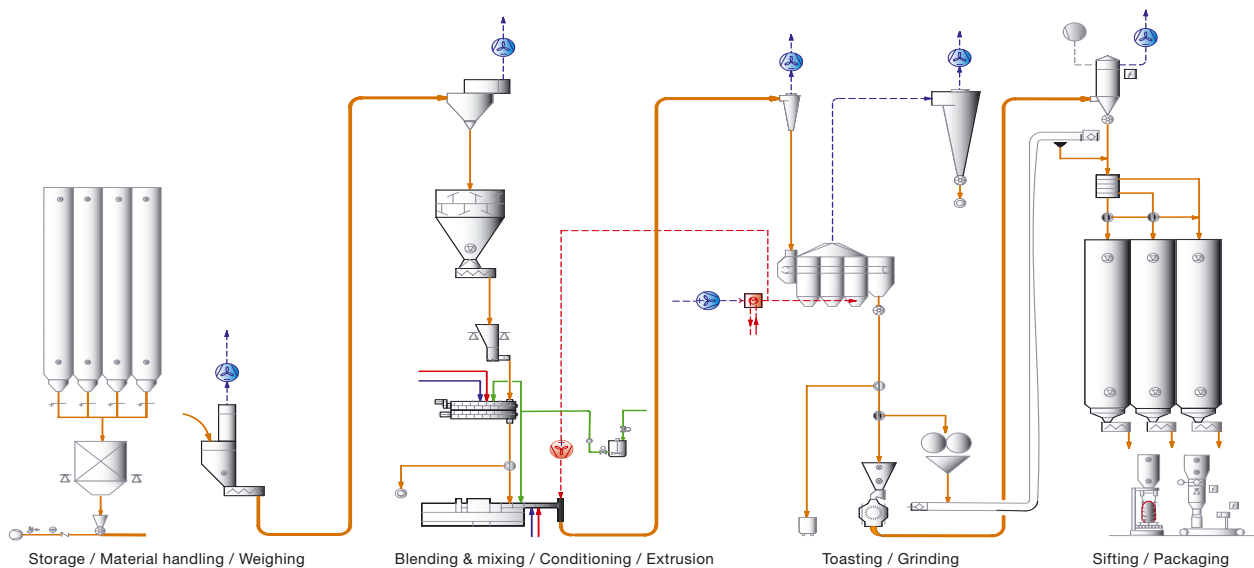


Reconstituted rice

The extrusion process allows ground broken rice to be transformed into new grains which are all but indistinguishable from natural rice. The main features such as color, shape, size, texture, and cooking characteristics and cooking time of these rice-like grains can be tailored to the requirements of specific applications by modification of the extrusion parameters. This process provides the basis for the production of fortified rice, where vitamins and minerals are added to the flour mix. The production process for making fortified rice grains is protected worldwide by our patents.

Instant rice	Ready to eat after pouring hot water over it
Quick-cooking rice	Reduced cooking time
Fortified rice	Enriched with vitamins and minerals

Integral solutions.
From reception to dispatch.



Core system components from Bühler. The crucial process stages.

Preconditioner

In the preconditioner, two separate process operations take place: ingredient mixing and retention of the material to allow wetting/exposure to moisture. The preconditioner is available in six sizes ranging from 100 to 1600 liters' holding capacity and processing capacities ranging from 100 to 20,000 kg/h.



Twin-screw extruder

The modular twin-screw extrusion system covers the entire operating range from the laboratory scale to large-scale commercial production capacities. The configuration of the machine is carefully matched to the specific application process.



Fluid-bed dryer

The continuous fluid-bed dryer/cooler is excellently suited for the thermal treatment of extrudates with a particle size starting at 0.25 mm. The fluid bed, which is designed as a cross-current exchanger, fluidizes the individual product particles and dries/cools them gently and efficiently across the entire bed length.



Fluid-bed dryer/toaster

The fluid-bed dryer/toaster with its forced conveying action is applied for drying and toasting a wide variety of pellets and free-flowing materials. The modular chamber system allows the machine size to be selected that is ideally suited to the required retention time and material throughput.



Wide variety of raw materials, product shapes, and uses.
Basis for natural nutrition.



Modified flours and starches

High water absorption requirements for flours and starches? No problem. Extrusion will enable you to achieve the desired product characteristics.



Breadcrumbs

Tailored to your specific requirements: Particle size distribution, texture, and color of your breadcrumbs.



Texturized proteins

Identify trends at an early stage. Extruded texturized proteins as meat substitutes – a delicacy with a bright future.



Reconstituted rice

Upgrade your broken rice. Our extrusion process allows you to process broken rice into new rice grains, which you can enrich as required with vitamins.

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