

# Breakfast Cereals.

Production plants from a single source.



# Proven cooking and forming processes...

## Integral element of the production process.

### **Cooking and forming of breakfast cereals**

Breakfast cereals have become firmly established on breakfast tables almost all over the world. In addition to a wide variety of forms, tastes and colours, they are expected today to also meet stringent nutritional quality requirements. A consistently high product quality, high operating reliability, and maximum efficiency are the most important requirements that state-of-the-art production systems must satisfy. To meet them, Buhler offers its customers a multitude of suitable system components plus the relevant expertise in plant design and construction and in process engineering.

### **Raw materials reception and storage**

Buhler supplies bulk reception and storage systems, Big Bag unloading stations, or manual intake hoppers with high-precision proportioning elements and reliable conveying systems, which offer flexible and hygienic handling of raw materials.

### **Raw material blending and mixing**

Different levels of automation cover functions such as product retracing or logging of production statistics according to specific needs, manpower requirements, or legislation.

### **Extrusion processes**

Extrusion is the most frequently used process for cooking and for complete or partial forming of cereal products. As an HTST (High Temperature Short Time) process, extrusion is a comparatively gentle process. As it uses a minimum of water, it is a low-energy process and therefore ecological as well as economical. Using steam and water, the premixed solids are fed into the process. They are partially heated almost to boiling temperature using an additional preconditioning stage and precooked more or less intensively, depending on the water content and the selectable retention (dwell) time. If required, the taste-imparting substances are also added to the preconditioner stage in order to promote aroma reactions as early as during this stage. This allows the raw materials to be cooked with the introduction of more or less mechanical energy as a function of the product. The water content and the temperature-versus-time profile can be precisely set. This enables accurately defined and consistent product qualities to be obtained within a broad variation range. Additional colorants, flavouring agents or mineral additives enhance the visual and taste-related attractiveness of the products as well as their nutritional value.

### **Forming and cutting**

Cutting can be accomplished directly at the die face or farther downstream in a separate cutter. Together with the process conditions prevailing inside the extruder, the suitable die hole geometry, the extrusion speed, and the cutting mode determine the form and texture of the product. Depending on the requirements, it is possible to extrude direct-expanded products with two- or three-dimensional forms or semi-finished pellets for subsequent indirect expansion. (Co-extruded) cereal pouches filled by filling mass systems can be neatly formed from the strand of product in a pillow cutter, producing leak-proof pillows.

### **Traditional cooking**

As a complement to the extrusion process, also traditional cooking stages can be integrated. Whole grain or coarse grain fractions can be cooked to the point with the necessary classification and involving minimum shearing. Batch cooking offers the right alternative to the fully continuous process especially for corn (maize), wheat or multi-grain products.

### **Cold-forming, flaking**

Beside the cooking process with subsequent forming at the extruder die face, Buhler also offers two-stage cooking processes. In these, cooking and final forming are separately performed in two machines. Two common representatives for indirect-expanded cereal processes are single-screw extrusion and flaking by rolls. Single-screw extrusion with vertical face cutting is applied for making high-precision products and/or when high throughputs are involved. For rolled breakfast cereals, Buhler offers its tried-and-tested flaking roller mills.

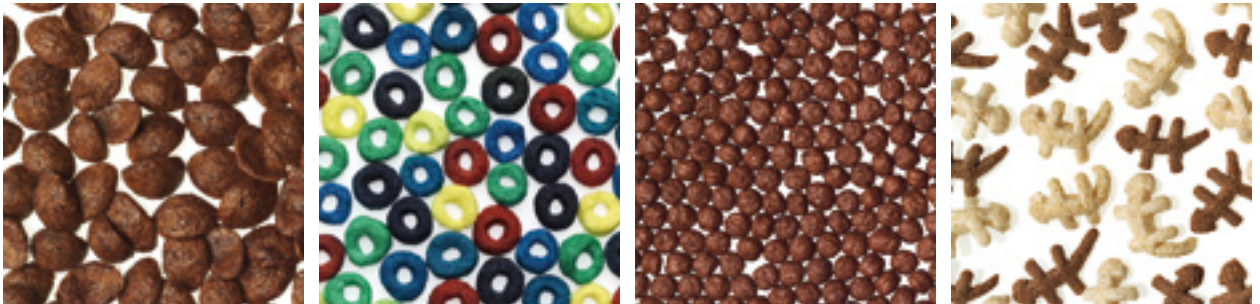
### **Thermal treatment**

Browning, expansion degree, texture, surface structure, true-ness of form, storage stability, flavor, and numerous other characteristics are essentially controlled by thermal treatment. The functions of hot-air conveying, predrying, tempering, toasting, puffing, cooling, and final drying offer a multitude of solutions which must be carefully matched.

### **Coating**

Liquids metering and solids proportioning units allow the application of fat- or water-based solutions in combination with spices, nut slivers, etc. These systems guarantee a wide variety of solutions, thanks to heatable or coolable drum types: Even critical applications such as high-Brix coating up to 95 Brix are possible.

## ...for high-value breakfast cereals. Varied characteristics in shape and color.



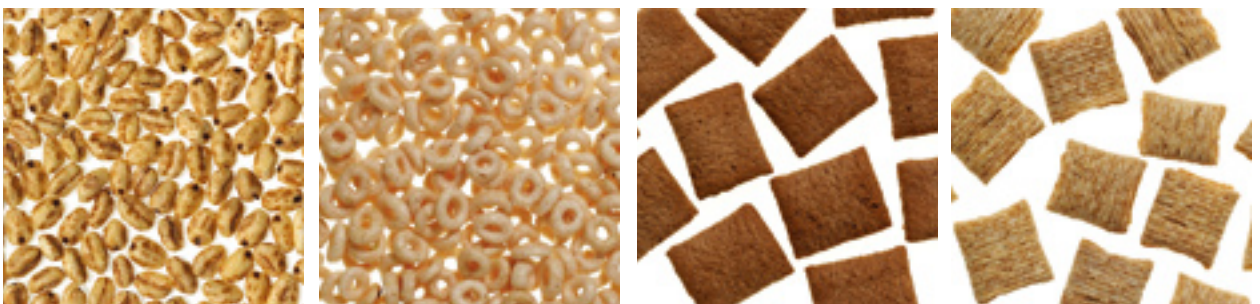
### **Direct-expanded cereals**

Widespread traditional products as well as customized shapes. The process, for which a patent is pending, also allows simultaneous production of different colors. If required, products may also be spray-coated.



### **Expanded flakes**

Cornflakes or wheat, rice, and multigrain flakes etc. produced by the same processes: extrusion or traditional cooking. Spray-coating is also possible, e.g. with sugar syrup or dry ingredients such as nut slivers.



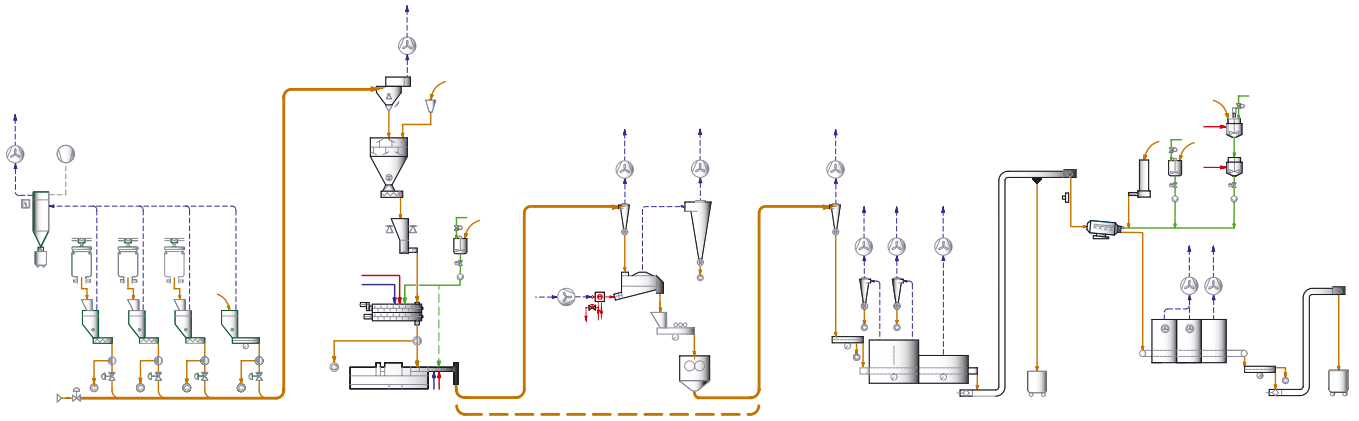
### **Indirect-expanded cereals**

Puffed products made from extruded pellets or whole grain such as corn (maize), wheat, or rice. Spray-coating and coloring are also possible.

### **Co-extruded cereals**

Water- or fat-based fillings in direct-expanded cereal envelope. Very wide variety of shapes, surface structures, colors, and textures.

# Integral customer solutions. From intake to shipping.



Storage  
Maintenance  
Weighing

Mixing  
Extrusion  
Cooking  
Shaping

Predryer  
Flaking

Toasting

Coating  
Drying  
Packaging

# Extensive range of services. From engineering to training.

## Extrusion pilot plant

The functional extrusion pilot plant supports practical development of new products, processes, and equipment, complementing scientific approaches to problem solutions. Various process stages can be simulated here either in isolation or in a wide variety of combinations.

## Engineering

Our project engineers will ensure smooth handling of your order, making sure our systems are seamlessly integrated in your production environment.

## Installation and start-up

The installation and start-up specialists of the "Pasta and Extruded Products" business unit guarantee competent installation and construction site management and a smooth commissioning to start-up.

## Training of customer personnel

On your request Buhler offers you a personnel training on site also the opportunity to perform the training in our pilot plant. You take profit of the highly diversified program, executed by our specialists.

## Customer service

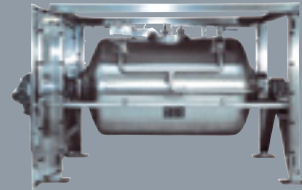
Our engineers and service specialists are available for on-site consulting, ensuring trouble-free operation of our equipment throughout its service life. This concept is supported by a worldwide, efficient spare parts service.

# Core elements from Buhler.

## The crucial process operations.

### Batch Cooker BSTC

The BSTC is applied to processes including traditional (discontinuous) cooking of whole grain or coarse fractions. The compact rotary drum cooker is an all stainless steel construction. Its 1,700 l pressurized vessel is designed to receive batches of up to 800 kg. The component is installed as a complete module with fittings and a separate operator's panel. A PLC control system ensures accurate and stable process conditions over the entire automated cooking cycle.



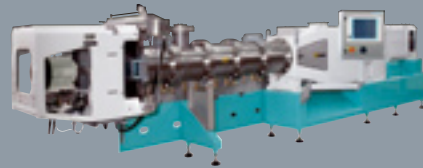
### Preconditioner BCTC

The preconditioning concept is based on a separation of the overall process into two stages: A highly efficient raw component mixing-steaming-heating unit and a retention unit with an adjustable residence time. Available in 6 sizes, the pre-conditioner can cover a wide range of process requirements with respect to residence time and throughput. Thus, the BCTC is especially suitable for indirect expanded products.



### Twin-Screw Extruder BCTA

The modular twin-screw extrusion system offers highest flexibility for continuous mixing, cooking and forming steps. Fine mechanical engineering and an integrated PLC control system allow for stable process conditions. Moreover, the elaborate construction ensures easy adaptation to different products and processes. All together the BCTA series is an effective tool to meet today's but also future quality and production needs.



### Single-Screw Former BCXA/BCXO

A century of experience in pasta process technology stands behind the latest single-screw former design. Dedicated to the production of sophisticated breakfast cereals, this tool combines the features of the successful BCTA twin-screw cooking extruder with those of the cold extrusion technology applied to pasta processing. Sanitary design, careful material selection for the components and optimized screw and die geometries result in optimum product quality and operational reliability.



### Flaking Roller Mill BCFA

A steady and focused further development has created the latest Buhler flaking tool. While adding modular functions onto the platform as requested an optimum match of the equipment to the customer's needs is guaranteed. Improved efficiency, reduced maintenance time, sanitary design and a number of features to control product quality ensure a safe and economic production of flaked products.



### Coating Drum TNBB

The coating drum adds a sweet, savoury or coloured finish to the product in an ultimate step prior to drying/packaging. It is suitable for breakfast cereals such as flakes and extruded products. Paired with the liquid preparation and dosing system, various water and fat based solutions are applicable. An added-on solid dosing system may refine your product further. Sanitary design and stainless steel construction allow for wet cleaning.



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