Innovative solutions for processing nuts.
Sustainable solutions for the nut industry.
Efficient processing that is safe for food.

Nuts are refined using many processes and are thus valued all over the world for the ways in which they enrich food – either processed as ingredients or in their natural state. The huge number of different nuts is matched by the many different ways in which they can be processed – either as whole nuts or chopped, with and without their shells, roasted or blanched, or as flour or paste. Bühler has appropriate process solutions for all these processing stages, from goods in to the finished end product – all highly efficient and in compliance with strict food safety standards.

Bühler has many years of experience in the industrial processing of nuts: hazel nuts, peanuts, cashew nuts, pistachios and almonds are treated with great care. In the course of this, Bühler provides solutions for individual process stages and complete systems, including extremely modern automation solutions – all from one single supplier.

Roasting is one of the most important methods for processing nuts. This is why Bühler can offer an unparalleled portfolio and process knowledge. Regardless of whether the throughput is low or high or continuous or batch processing is used, all Bühler’s roasting systems deliver excellent, consistent quality thanks to the unique air circulation systems. Different shelling, chopping and grinding systems complete the range that offers energy-saving and low-cost processing of nuts and oilseeds.

Food safety is Bühler’s primary concern. The CCP pasteurization procedure is highly innovative and works in a unique way, reducing the level of salmonella in almonds, nuts and seeds very effectively and avoiding harsh processes that may damage the nuts. Optical sorting solutions provided by Bühler SORTEX also ensure that only perfect raw materials are subsequently used for processing, with foreign materials, damaged and decaying nuts reliably segregated.

However, Bühler offers more than just leading-edge technologies. Thanks to its extensive range of services and network of representatives in 140 countries, Bühler assists its customers at their premises with technicians and spare parts, training courses and test facilities for process and product optimization.

Advantages for the customer:
– Bühler supplies a comprehensive range, from individual machines to entire systems
– Highly modern automation solutions for trouble-free operation
– Bühler offers system planning, design, installation and start up by one and the same supplier
– Continuous development work for leading-edge food safety and process solutions
Bühler provides the appropriate processing technology for every kind of nut.
The value chain at a glance. From goods in to the finished product.

(1) Cleaning and transport
- Tailor-made, reliable and efficient solutions for cleaning and transportation within the system.
- A large number of solutions for separating undesirable elements and pneumatic or mechanical conveyors is available.
- Bühler has extensive engineering experience for implementing projects of all sizes all over the world and would be pleased to assist you.

(2) Optical sorting with SORTEX solutions
- Improving food safety and quality by removing foreign materials and rotting or harmful nuts.
- Sorting according to size and shape for optimum processing methods.
- Removing blanched nuts that are discolored or where the skin has not been removed.
- Reducing aflatoxins through efficient removal of affected nuts.

(3) Roasting: Barth NR, Barth RoaStar, AeroRoast
- Extensive portfolio of nut roasters to cover every application and requirement.
- Batch-operated roasters for demanding roasting qualities or continuous dryers and roasters for high throughputs of up to 25,000 kg/h.
- Unique air circulation systems for excellent and consistent product quality, color and moisture content.
Complete nut line with central automation:
Every process step is significant when processing
the raw materials into valuable nut products.

(4) Pasteurization: Barth CCP, Barth NR-CEP
- Steam pasteurization matched to
every requirement and application.
- Batch systems for reproducible
processes which can be monitored
and documented at any time.
- Patented and TERP-accepted
procedure.

(5) Size reduction and grinding
- Size reduction and grinding nuts
into small particles, creating flour
or pastes.
- High degree of food safety through
appropriate design.
- Very fine ground pastes with fine-
ness of less than 20 µm possible.
- Sustainability through minimal
energy requirement.
- Stable process, even for different
product qualities.
- Reproducible and monitored
production processes.

Automation
- With WinCos® Bühler provides a
state-of-the-art automation solu-
tion for the control and monitoring
of production systems.
- Tried-and-tested visualization pro-
cess and extensive interfaces and
functions support smooth opera-
tion.
- Recipe-controlled processes make
for uniform product quality and
batch traceability.
Optical sorting systems for high demands. Food safety, quality and raw material yield.

Optical sorting systems from SORTEX are the ideal choice for nut processors who set the highest standards in respect of food safety, quality and yield. With these optical sorting solutions from SORTEX, it is possible to sort a wide variety of nuts in different stages of processing: untreated or blanched, whole or chopped, raw or roasted. These include peanuts, almonds, hazelnuts and many other sorts of nuts, where the system also needs to be capable of identifying and segregating complex defects and foreign materials.

A leader in food safety, product quality and production yield

Thanks to the latest InGaAs and PROfile technology, MultiVision inspection system, high-pressure ejector and optimized feed mechanism, even fine differences in color and difficult-to-identify contamination, such as shells, casings, skin, stones, lumps of earth, stalks and glass can be segregated. Aflatoxins are reduced thanks to selective identification of nuts infected with fungus.

Stable performance for maximum benefits

Bühler’s optical sorting machines are equipped for superior precision, performance and efficiency. Climate control delivers a constant temperature, and therefore a stable performance, even under extreme ambient temperatures. The ultra-flexible solid broadband LED lighting
is extremely durable. Combination with the long-life and easy-to-service ejector technology permits optimum operation of the system over a long period of time.

Highly precise optical sorting minimizes the inadvertent ejection of intact nuts. Gentle handling of the product within the process zone avoids damage to good products. An option for simultaneous post-sorting allows intact products to be recovered from the segregated product flow, thus increasing the yield. The open design and the use of stainless steel for product-contact parts permit hygienic operation and simple cleaning.

**Advantages for the customer:**
- Excellent product quality and hygiene as a result of the segregation of foreign material and nuts that are of inadequate quality or infected with *Aspergillus flavus* fungus
- Sorting according to size and shape to optimize the subsequent processes or for consistent product quality
- Several configurable equipment options
- Higher productivity with lower operating costs

**Optical sorting solutions from Bühler – powerful, even for difficult tasks.**

<table>
<thead>
<tr>
<th>Accepted products</th>
<th>Segregated products</th>
<th>Accepted products</th>
<th>Segregated products</th>
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<tbody>
<tr>
<td>Only perfect almonds reach the next production stage.</td>
<td>Almonds that are damaged, contamination, etc. are segregated.</td>
<td>Perfect nuts reach the next production stage.</td>
<td>Yellowed nuts are segregated.</td>
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Tailor-made roasting systems from Bühler. The perfect solution for every application.

The roasting process is the key factor when creating the typical nut characteristics such as aroma, texture and product color. Bühler’s hot-air roasting systems are ideally coordinated for this and are known for their roasting quality. The solutions cover the requirements of both large and small nut processors perfectly.

Barth NR batch roaster
The Barth NR nut-roasting machine can be deployed in a versatile way: batch operation gives maximum flexibility when roasting nuts and oil seeds. Processing will be equally effective, irrespective of whether it is hazelnuts, almonds, peanuts, macadamias, pecans or cashews that are being roasted or, for example, pumpkin or sunflower seeds. Furthermore, the specially developed roasting process will ensure that the various products will have a long shelf life. The optional CEP debacterization technology will provide steam debacterization of more than five log units in the case of vegetative microorganisms.

Barth NR highlights:
- Enormous flexibility like a profile roasting thanks to the batch roasting system
- Partly fluidized roasting processes for ideal aroma development
- Long shelf life for nuts thanks to tried-and-tested two-stage roasting process
- High cost-efficiency through efficient energy transmission
- Optional 5-log pasteurization (accepted by TERP)

Continuous roasting using AeroRoast and Barth RoaStar
Bühler offers two systems for continuous roasting. The modular AeroRoast high-performance roaster features a controlled dual-plenum air flow that ensures that air is distributed evenly over the entire conveyor belt. With up to 25,000 kg/h, throughputs with Bühler Aeroglide’s AeroRoast can be very high.

The Barth RoaStar vertical roaster guarantees extremely gentle treatment of nuts, as the product being roasted is transported purely by its inherent weight. Another point in its favor is that a high proportion of the energy from discharged air is reused for the roasting process by deploying heat exchangers to regenerate heat.
Furthermore, the small number of moving parts produce very little wear and do not require much maintenance.

**Highlights of AeroRoast and Barth RoaStar:**
- Designed for medium to high throughputs
- Separately controllable roasting zones operating on the countercurrent principle ensure that roasting is consistent
- Automatic process monitoring for extensive process security

**Advantages for the customer:**
- Tried-and-tested, long-lasting roasting systems for different sorts of nuts
- Controlled and consistent hot-air roasting that is gentle on the product
- The optimum roasting system for every application and requirement
- Hygienic design for clean and safe operation
Bühler has several sophisticated and tailor-made solutions for efficient pathogen control in nuts. The techniques deployed are characterized by ease of use, adaptive process parameters and high effectiveness.

**Barth CCP – Controlled Condensation Process**
Controlled steam pasteurization using the Barth CCP reactor is based on a pressure-controlled batch principle. All important parameters such as time and temperature can be set individually to suit each product being treated. An optimal result is always achieved in respect of log reduction and product quality, thanks to the numerous variation options for process design within a very wide range.

**Barth NR-CEP – roasting and pasteurization**
Granular products can be steam pasteurized during the roasting process, thanks to the optimum CEP function of the Barth NR batch roaster. Here pasteurization is independent of the degree of roast so that germ control is even possible without roasting. The patented roasting and debacterization technology achieves a better than five-log inactivation of pathogenic microorganisms such as salmonella.

**Advantages for the customer:**
- A suitable steam debacterization solution is available for every requirement and application.
- Bühler batch systems with modern online process capture guarantee reproducible results
- Extensive project support for planning, design, installation, startup and validation of the process (PROValid)
Bühler’s technologies for grinding and size reduction have been deployed successfully for decades. The solutions for nuts include both small-scale mills for pregrinding and high-volume agitated media mills for fine grinding. A feature of all mills is that they are robust, energy-efficient and offer a high level of food safety.

Process technology for filling or spreading pastes
Bühler applies a combination of two tried-and-tested process stages for the efficient manufacture of nut pastes, which together offer the highest product quality. The pieces of nuts are liquefied to a pumpable compound during the pregrinding process. In the subsequent fine grinding process, the nut solids are ground to the required end fineness.

Bühler uses the UniMill hammer mill or the SCS impact and shear mill for pre-grinding. The slow-running FineGrind bead mill, which has also been proven to be successful in the chocolate industry, is used for fine grinding. All machines are standouts thanks to their robust and functional construction, which ensures excellent fatigue strength and a stable process even with very different product qualities.

Size reduction of nuts
Bühler’s UniMill hammer mill is also suitable for the size reduction and grinding of nuts to nut flour. The application range includes roasted hazelnuts, almonds and other sorts of nuts.

The Barth CM chopping machine is used to produce nut pieces. This is an infinitely variable procedure, which involves crushing the nuts between rotating rollers. This process provides optimum yields and a wide range of particle sizes. Compared to the cutting process, the Barth CM’s energy consumption is very low.

Advantages for the customer:
– High-precision system for optimum chopping and grinding results
– Robust design for reliable continuous operation and high productivity
– High level of energy efficiency and food safety
Global partner for complete systems. Expert solutions from a single source.

Every system for processing nuts is unique and requires customer-specific process solutions. Bühler plans, installs and automates complete lines for very different kinds of nuts in accordance with the customers’ requirements – from the first planning phase to the time when successful production starts.

Bühler has knowledge of the entire value chain for nut processing – from delivery of the raw materials, cleaning and sorting to the debacterization, roasting, chopping and grinding process stages.

The solutions deployed are characterized by high efficiency, reliable operation and easy maintenance. User-friendly operation, product traceability and uncompromising safety are further plus points – regardless of whether individual process stages or entire systems are involved.

Bühler’s extensive process knowledge of complex production lines is reflected in WinCos®, the modern system of automation. Tried-and-tested visualization concepts, numerous interfaces and practical functions make for simple and problem-free operation of systems and seamless monitoring of production. Recipe-controlled processes provide consistent product quality and ensure traceability of the goods produced.

Bühler is the right partner for technological challenges. As global plant engineers with experience in the implementation of projects of practically every size, Bühler knows the risks involved in installing and operating a system, has the relevant time management and can provide reliable business support.

Advantages for the customer:
- Experience in planning and implementing plant engineering projects globally
- All services from one single source, thus avoiding interface problems
- Extensive automation solution for process control and traceability
- Coordinated process steps for optimum yield and product quality
Services from Bühler.
Practice-based pilot plant and laboratory trials.

Bühler operates its own test facilities and laboratories for the food industry worldwide. Professional tests and analyses allow customers to make an accurate evaluation of the different process steps and their results.

Many very different processes can be tested and optimized at the Bühler’s own test facilities in Europe, Asia and the USA. Experienced process engineers carry out pilot trials and test series with the customer prior to a decision on whether to buy.

Pilot plants enable trials to be carried out on a small industrial scale to optimize products or processes. These trials also provide an insight into the required dimensioning of the potential plant.

The Bühler central laboratory in Uzwil is the ideal point of contact for demanding analysis tasks and also offers services such as consulting, training and method development.

Advantages for the customer:
- State-of-the-art pilot plant for customer trials
- Product and process optimization
- Many years of experience in the field of nut processing
- Support from qualified food and processing engineers
- Interdisciplinary exchange with other areas of Bühler’s expertise and with educational establishments
24 hours a day, seven days a week, worldwide. Services for more productivity and safety.

Bühler is the world’s leading technology partner when it comes to manufacturing cocoa, chocolate and nut products. The tried-and-tested production systems combine products of first-class quality and a high level of efficiency.

Customized maintenance, retrofitting and reconditioning packages ensure that machines are always state of the art. The advantage: customers can produce their articles profitably and safely even with older plants.

Bühler is represented in more than 140 countries, maintains its own production, development and service locations worldwide and is quickly on site when customers need support. Technicians procure spare parts quickly and install them professionally. Specialized Bühler service locations carry out extensive retrofits for existing systems in the nut industry.

Specially tailored training options enable smooth operation of the machines, allowing you to produce excellent product quality with optimum throughput. The training courses help improve plant output and keep operating staff abreast of current technologies and safety standards – for labor law regulations as well as food safety.

Focus areas of the Bühler service range:
- Food safety
- Operator protection
- Operational reliability and quality consistency
- Overall equipment effectiveness (OEE)

Global presence.

North America
- CA Markham
- US Mahwah
- MN Minneapolis
- MA Raleigh
- UK Stockton

Europe
- AT Salzburg
- BE Mechelen
- BY Minsk
- CH Uznani
- DE Freiburg a.N.
- FR Saarbrücken
- NL Viernheim

South America
- AR Buenos Aires
- BR Blumenau
- CL Rondônia
- CO Bogotá
- VE Caracas

Africa
- DZ Hydra/Algiers
- EG Cairo
- KE Nairobi
- MA Casablanca
- TG Lomé
- ZA Johannesburg

Asia
- AU Melbourne
- BD Dhaka
- CN Beijing
- IN Changli
- TW Nantou
- VN Ho-Chi-Minh-City

Focus areas of the Bühler service range:
Bühler services ensure that the systems will remain productive and operate reliably in the long term.