Food Innovation Center.

Innovation. Collaboration. Solutions.

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The new Bühler Food Innovation Center, located in Plymouth, Minnesota is a food-grade facility. This facility was designed according to sanitary standards and is maintained and operated under general FDA food industry guidelines.

Equipment
Several key pieces of equipment are available to meet your specific process requirements.

- Sanimix Batch Mixer (MRMA)
- POLYtherm™ Preconditioner (BCTC -10)
- POLYtwin™ Twin-Screw Extruder (BCTG)
  - 62mm twin-screw extruder
  - 20 L/D (additional lengths available upon request)
  - 100 - 1000 kg/h rates
- Bühler AeroDry High Sanitation Conveyor Dryer
  - Single-pass, two-zone with cooling
  - New sanitary design
  - Gas fired
- UniMill (SCBU)
- Bulk packaging
- Steam pasteurization / sterilization system CCP
- Additional equipment options available upon request

Product Competencies
The Innovation Center was designed with process flexibility in mind, making it ideally suited to various product types.

- Direct-expanded products
  - High protein
  - High fiber
  - High fat
  - Nutriceuticals
  - Non-typical commodity ingredients
  - Combinations of above
- Co-extruded products
  - Filled centers
  - Colored centers or shells
- 3rd Generation Collets
- Inclusion and topical pieces
- Breadings, flatbreads, etc.
- Modified flours / starches
- New product innovations and value-added products
- Steam pasteurization or sterilization of low-moisture foods

Highest sanitary standards.
Operated under FDA food industry guidelines.

GMP pass-through room.

Supporting your unique process concepts.
Benefits and advantages.

Benefits
The Bühler Food Innovation Center provides several important benefits.

- North American location with global support
- Food-grade equipment
- Scalable operation
- Basic physical analysis
- Private office/conference room available in the Center
- Customized customer training
- Extrusion workshops
- Flexible and customizable to support non-standard process concepts
- Non-competitive and confidential
  - NDA, CDA, & MTA available
- Ingredient sourcing support
- Able to accommodate market trials
- Electronic data collection
- Wifi availability
- Inspection and certification compliance available upon request for an additional fee
  - Organic
  - Gluten-free
  - Allergen-free
  - Kosher
  - Kosher Passover
  - Halal

(Note: Limited ability to conduct non-food trials.)

Additional Advantages
Still looking for more reasons to take advantage of the Bühler Food Innovation Center? Consider the following outside services located nearby:

- Analytical services
  - R-Tech
  - MVTL Laboratories
  - Medallion Labs
  - Merlin Development Labs
- Custom packaging services
  - ProAct, Inc.
  - Innovative Packaging Solutions
  - RytWay

To schedule a product or process trial or to learn more about an upcoming extrusion workshop, contact:
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Equipment Control Center.

Raw material intake.
Intake, measuring and mixing.

Food Innovation Center Raw Material Intake Room.

Sanimix.
Homogenous mixing and the highest sanitation.

Application
- The mixer can be applied for powders, flakes, and granular products.

Fast mixing and discharge
- The horizontal mixing process and matching geometry of the mixing tolls provide a fast mixing cycle.
- The single discharge gate spans the entire length of the mixer, reducing discharging time to a minimum.

Solid and rugged design
- The solid stainless construction is perfectly suited to accommodate the forces generated inside the mixer.
- The well thought out design minimizes maintenance requirements.

Hygienic and easy to clean
- The seamlessly welded interior is gap-free, eliminating the existence of areas where product could settle.
- The mixer is self-discharging, using a drop-bottom gate design.
- The large service door allows easy access for cleaning.

Preconditioning and extrusion.
Weighing, dosing, heating, mixing, cooking and kneading.

Preconditioning and Extrusion Room.

POLYtherm™ Preconditioner.
The economical allrounder.

Consistently high product quality
- Separate mixing and retention zones.
- In the mixing zone, material is optimally mixed with steam or liquids.
- Due to the separation of the two zones, retention time can be precisely controlled and is completely independent from mixing, allowing adaptation to specific product requirements.

Space-saving design
- The material inlet is vertically positioned exactly above the outlet, saving space and allowing it to be easily moved to one side and bypassed when preconditioning is not required.

Highest level of sanitation
- Large doors on both sides allow for easy access to the entire interior of the machine, permitting easy cleaning and maintenance.
- The overlapping flight configuration in the mixing and retention zones provides thorough scraping of all internal contact surfaces, enabling complete discharge of the preconditioner upon production completion.

Low energy costs
- Due to efficient precooking in the POLYtherm™, the mechanical energy input in the extruder is reduced significantly.
- Torque is reduced by up to 50%, lowering energy requirements, and increasing extruder throughput capacity.

POLYtwin™ Twin-Screw Extruder.
Powerful, reliable and flexible.

Fully automatic screw ejection unit

- Bühler's patented, fully automatic screw ejection unit allows even tightly jammed screws to be removed, eliminating the need to disassemble the extruder.
- Screw removal can be achieved within a very short period of time with the push of a simple touch-screen button.
- The risk of damage to the screws is reduced to a minimum.

Highly flexible cutter

- Laterally moveable cutter.
- The cutter can be adjusted during operation, guaranteeing consistent, high-quality products.
- Knife heads can be quickly changed without interrupting production, thus optimizing production flow.

Modular design

- The innovative design of the housing, according to the "shell principle", offers high mechanical stability, wear resistance, and highly efficient tempering.
- Consistent ratio of housing length to screw size allows the modular process component to be easily adapted to higher capacities and various processes.
- The interior casing is extremely resistant to wear, minimizing maintenance costs. If replacement is necessary, it can be easily changed.

Intelligent process control

- To guarantee consistent, high-quality end products, the POLYtwin™ is equipped with an intelligent recipe memory. This decreases process errors and allows production to be quickly adapted to other recipes.
- Predefined start-up and shut-down sequences nearly eliminate raw material waste and considerably speed up the production process.
- An intuitive touch-screen mounted directly on the machine can be used to make fine adjustments, with the effects immediately visible.

Bühler POLYtwin™ Twin-Screw Extruder with Machine Control.

Drying.
Sanitary thermal processing.

AeroDry Dryer.

Bühler AeroDry High Sanitation Conveyor Dryer.
Sanitary thermal processing has evolved.

Discharge housing
- Large access door provides fast and easy cleaning, while also adding strength to the structure and reducing horizontal surfaces.

Unique continuous belt conveyor system
- Eliminates roller chain, traveling side guides and the traditional bedplates with stiffener legs, resulting in an easy to clean assembly with improved access.

Pitched slab roof and floor
- The durable, heavy guage stainless steel “slab” roof and floor are pitched to the same side of the dryer, promoting water runoff during wet wash.
- The dryer floor has a built in water management system that routes water and other cleaning fluids to a central drain for removal.

Sanitary doors
- Continuously welded skins and surface-mounted hardware provide for no penetrations, eliminating the risk of contamination to the panel’s interior.

Non-tubular open channel frame design
- Dryer frame design uses an open “C” channel structure, eliminating hollow shapes and water entrapment areas.

Dryer support structure
- Vertical and horizontal support members oriented at 45° to minimize horizontal shelves, decreasing cleaning time.
- Built-in thermal expansion capability that reduces stress on the frame.

Rinse in place belt wash system
- Fully automated cleaning with continuous belt-rinsing system that washes both sides of the conveyor belt.

Additional design features
- Cracks, crevices and horizontal surfaces minimized throughout.
- Fewer areas for fines build up.
- Improved access.
- Easier and faster to clean.
- Efficient operation - flexible and easy to use controls simplify operation.
- Consistent product quality - superior airflow systems and temperature controls provide moisture uniformity and more consistent products.

Custom size reduction & bulk packaging.
Bulk packaging in super sacks.

UniMill.

UniMill.
Versatile hammer mill.

Application

- For the reduction/grinding of dried extruded pellets for modified flour and breadcrumb applications.
- Can also be used as IP protection for waste products.
- Reduction of waste volumes.

Design

- Mill housing made of stainless steel.
- On motor base or stainless steel frame.
- Full rotor with rigid beater bars or beater rotor with moveable grinding beaters.
- Various grinding inserts.
- Driving motor at housing flanged.
- Rpm 1500 min^{-1} or 3000 min^{-1}.
- Several screen types and sizes available.

UniMill Highlights

- Simple, rugged machine for fine grinding of a wide variety of materials.
- GMP-compliant design.
- Easy to operate and service.
- Grinding of finished goods for IP protection.

Bühler Automation Systems.
Increase productivity and improve production quality.

Industrial markets are more dynamic now than ever before. Process automation is vital to the continued success of all manufacturers who want to increase productivity, maximize plant up-time, improve product quality, and remain competitive.

Local experts linked to an international network.
Bühler North America, based in Plymouth, Minnesota has a dedicated team of Process Automation engineers, who have access to a global support network of over 400 highly trained and experienced Automation Engineers. With over 4,500 automation systems installed worldwide, Bühler has the experience to work with you to maximize your unique process.

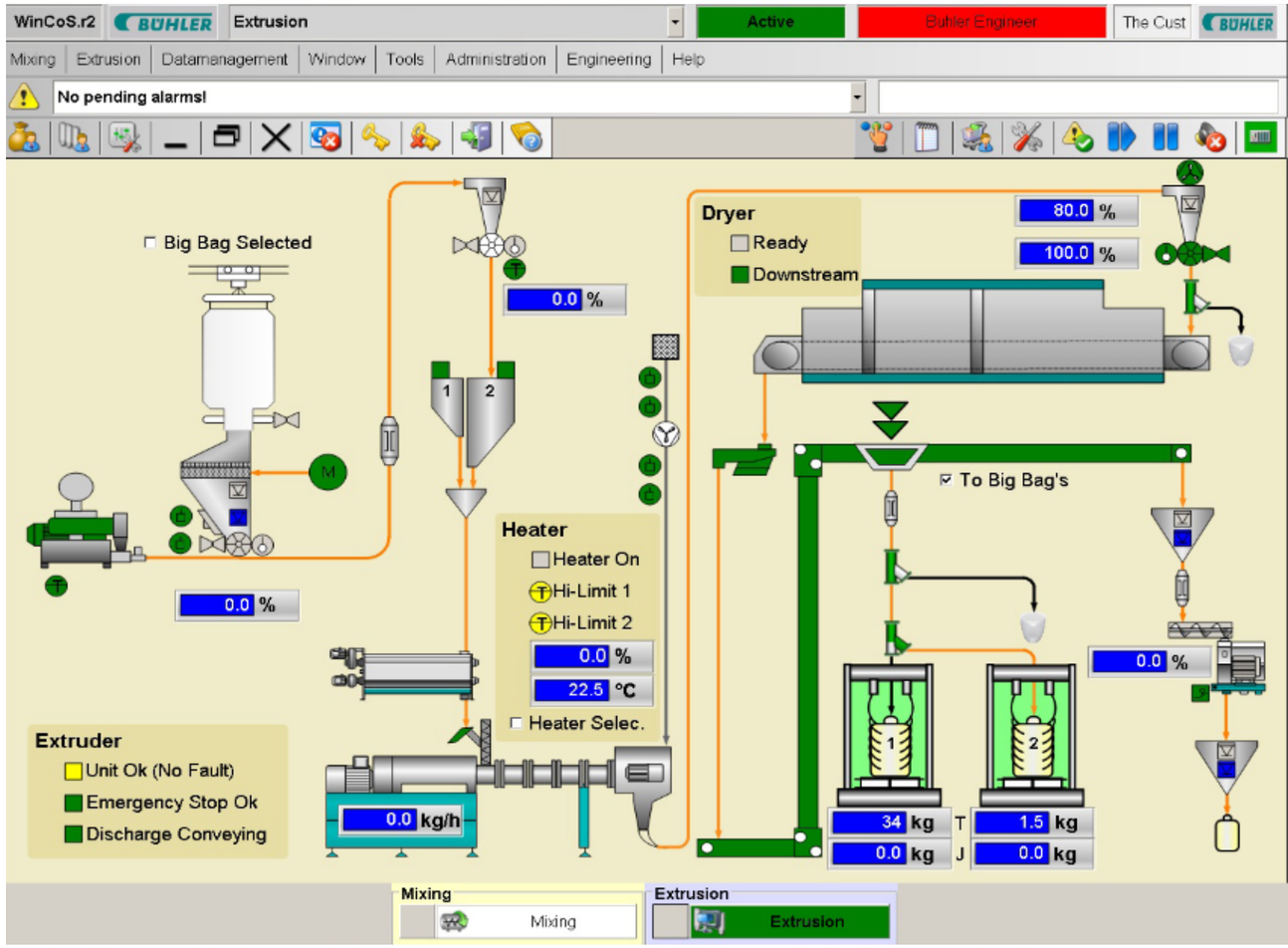
Single Source supply
- Complete plant engineering including automation system design.
- Detailed software and hardware design engineering.
- Plant expansions, retrofits and updates.
- Electrical engineering and installation.
- In-house and on-line software training.
- Technical training classes.

Trace and food safety
- Expert in food safety; integrating the latest technologies.
- Solutions meet high industry standards.

Ease of operation
- Proven operating philosophy.
- Seamless integration of local machine and overall plant control.

Critical information
- Key Performance Indicators (KPI's) available for every production step.
- Vertically integrated process automation providing production relevant data.

Timeliness of providing service
- 24/7 support hotline with guaranteed response time.
- Flexible service and support solutions.
- Remote diagnostics and support.



Bühler Automation System Control Screen.

Steam pasteurization or sterilization of low-moisture foods.

Controlled Condensation Process CCP.

Controlled Condensation Process CCP.
Food safety - the mindset has changed.

With the Controlled Condensation Process system CCP, Bühler offers a steam pasteurization or sterilization process for all varieties of nuts, seeds, spices and other low-moisture food.

Effective process due to settings selection flexibility

- Operation of the Controlled Condensation Process system CCP is based on the pressure controlled batch principle.
- Depending on the product being treated, this allows all the important parameters such as pressure, time and product temperature to be individually selected.
- Due to the countless variation possibilities within a very wide range, optimal pasteurization is achieved at all times.

Guaranteed 5 log reduction

- The CCP shows a reduction of more than 5 logs in the bacterial count for Enterococcus faecium, a surrogate for Salmonella.
- The CCP pasteurization temperature itself is a function of the pressure conditions during pasteurization. An increase in pasteurization pressure would increase the evaporation and condensation temperature and thereby the pasteurization temperature. Consequently, the inactivation rate can be increased by raising the pasteurization pressure and temperature.
- At over-pressure conditions, the CCP process is even able to inactivate thermophilic endospores on particulate goods so that the CCP can also be used as a sterilizer for low-moisture foods. In this context, “sterilization” aims to achieve a safe product and not necessarily a sterile product; this means sufficient inactivation of microorganisms that are dangerous for health or cause food to spoil.

CCP HIghlights

- Pressure-controlled process.
- Batch system for a safe and reproducible inactivation.
- Patent and TERP approved.
- Moisture content control.

Product quality

- After CCP pasteurization, products such as almonds or black pepper show no discernible changes in appearance, taste, texture or color, therefore no skin loosening, no flavor alteration and no significant changes in volatile oil fraction.

TERP approved

- Process validation received from the TERP (Technical Expert Review Panel) of the ABC (Almond Board of California, Modesto, Ca) in April 2008.
- This validates CCP as suitable for almond pasteurization securing a 5 log reduction of Salmonella SE PT 30.

Food Innovation Center BMIN 12/12

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