



PERFORMANCE SPRAY ENGINEERING

FOOD PROCESSING SPRAY NOZZLES, FABRICATIONS, & SYSTEMS

SOLUTIONS FOR SPRAY APPLICATIONS
IN THE FOOD & BEVERAGE INDUSTRIES

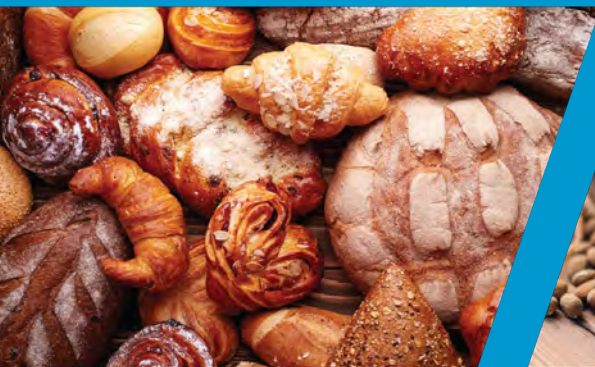




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PERFORMANCE SPRAY ENGINEERING

BETE's decades of experience providing innovative solutions to the food and beverage industries translates to **expert engineering that you can count on when it matters most.**

We design and manufacture spray nozzles for precision food processing operations – such as flavor and food safety applications, coating with liquids of various viscosities, and spray drying milk or formula. BETE® engineers and manufactures products that innovate equipment and tank washing, humidification, disinfecting, cooling, lubrication, and more. Our designs feature food-grade materials, connectors, and spray patterns, ideal for clean-in-place and sanitary requirements.

BETE's mission goes beyond just selling spray nozzles. It is to provide engineered spray process solutions that exceed customer expectations in every detail. Our patented spray technologies are quality inspected and field-proven to meet the high standards of third-party certifiers.

We make tens of thousands of different products, including automatic spray nozzles, air atomizing nozzles, misting nozzles, tank washing nozzles, spray drying nozzles, spray lances, fabrications, and automated spray systems. Expect world-class customer service from project inception through the delivery and maintenance of your final product. From initial discussions to design, fabrication, and ongoing service – **we will make your project a success.**



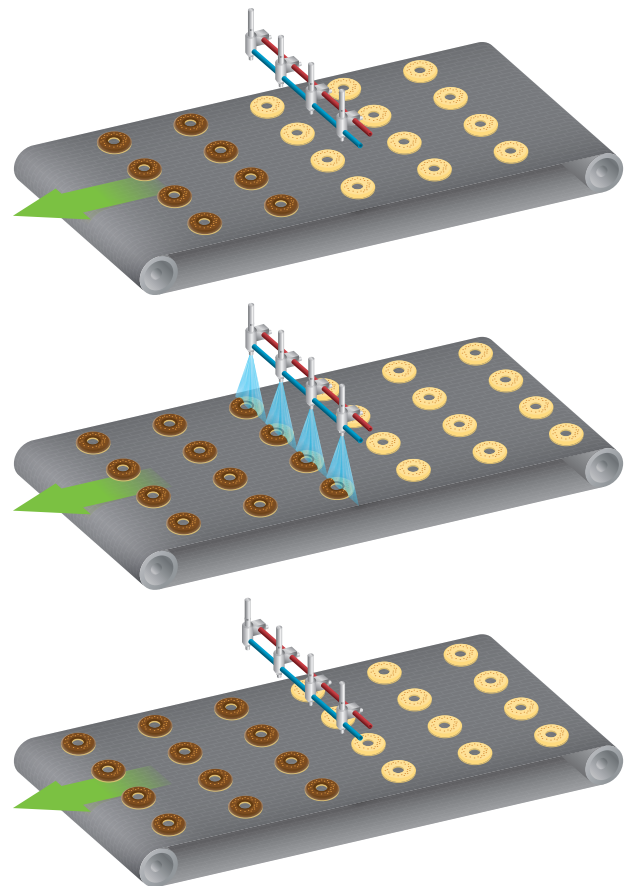


PRECISION SPRAY PROCESS APPLICATIONS

COATING & MOISTENING

Products may be moistened by water, for example, to allow the adhesion of seeds in a bread roll production line. Or more complex coatings of heated viscous fluids like chocolate or peanut butter may be sprayed. BETE offers a tailored selection of precision spray process solutions designed for uniform coating of products and equipment in the food industry.

BETE's coating systems and nozzles are designed to spray evenly with no dripping, whether they are applying a thin egg wash or spraying thick glaze onto a product. BETE engineers have decades of experience in recommending coating spray technology for all types of food processing solutions, such as conveyor coating and drum-mixing systems. A wide selection of direct pressure nozzles and air-assisted nozzles, combined with electric or pneumatic control options, allows BETE to tailor a solution to your needs.



PRECISION SPRAY PROCESS APPLICATIONS

LUBRICATION

Spray nozzles are capable of providing the accurate application of a wide variety of lubricants and release agents in the precise amounts and coverage densities necessary in critical applications including lubricating pans, molds or conveyors with release agents. In addition, BETE has years of experience in selecting nozzles to apply lubricants of all densities and viscosities with the throw and coverage necessary to cover critical machinery parts, tooling, and products during manufacturing processes.



CHALLENGES

Controlled spraying and viscosity on fast-moving conveyor systems require properly controlled, precise nozzles to reduce product waste and ensure quality. Viscous fluids tend to form larger droplets, affecting the evenness and adherence of the coating to the product.



For basic coating and lubrication applications, our standard BJ Low Flow Flat Fan Spray Nozzles and NF High Impact Fan Spray Nozzles offer uniform distribution with tapered edges for using in overlapping sprays. We also offer the NFV, which includes an integral strainer option.

For applications requiring greater accuracy, BETE's precision spray process solutions provide even spray coverage with minimal waste. Whether you are dispersing liquid ingredients into a coating pan; spraying glazes, oils, or bakery release agents; applying a syrup solution to a product traveling on a conveyor, or dosing a batch with flavored oil, we will make your project a success.



PRECISION SPRAY CONTROL SOLUTIONS FOR COATING, LUBRICATION, AND MOISTENING



BETE® FLEXFLOW™ PRECISION SPRAY CONTROL SYSTEMS FOR AUTOMATIC SPRAY NOZZLES

BETE's FlexFlow™ Spray Systems ensure precision control and flexible automation for our Electric HydroPulse® and other automatic spray nozzles. These plug-and-play controllers are an elegant solution for food processing applications where expensive spray media or ingredients need to be sprayed directly onto their process target. Each control panel can be used as a standalone system – or upgrade to the 2000 model to integrate with your existing plant operations. Discover optimal spray performance for applying flavorings, coatings, mold inhibitors, antimicrobials, preservatives, release agents, and moisturizers with exceptional accuracy.

BENEFITS:

- Control a wide range of flow rates
- Guarantee an even and uniform application rate that connects with conveyor line for automated speed adjustments
- Reduce consumption of expensive coatings
- Reduces overspray waste and improve product quality
- Exact target coatings secure a clean and safe environment
- Promote increased production
- Reduce maintenance and downtime
- Reliable spray dosing provides an accurate calorie count

USE AS A PRECISION SPRAY SYSTEM FOR A WIDE VARIETY OF FOOD PROCESSING COATING OPERATIONS:

- Application of antimicrobial agents for food safety
- Application of preservatives and mold inhibitors to help extend shelf life
- Application of egg wash
- Coat bottles to minimize scuff damage
- Apply water to balance moisture loss from the freezing process
- Apply coatings and release agents to pans, cookie sheets, and conveyors to prevent sticking
- Apply flavorings, oil, and butter to enhance the appearance and improve the taste of products
- Apply viscous coatings like syrups, glazes, and chocolate



PRECISION SPRAY CONTROL FLEXIBILITY

BETE's automatic spray nozzles offer a thoughtfully engineered selection of options to pair with our FlexFlow™ control panels. These systems are intuitive, accessible, and affordable – with desirable standard features included to streamline your precision spray automation implementation. Complete your installation with our skilled team of custom fabricators to create the ideal header, spray bar, or manifold for your unique food processing spray application.

AUTOMATIC PRECISION SPRAY NOZZLES

Available in a variety of configurations and spray patterns including hydraulic or air atomized sprays. All nozzles feature compact designs. Select nozzles include recirculation of sprayed liquid capabilities. External-mix air atomizers with shut-off and clean-out pins provide smaller droplet sizes, ensuring viscous fluids can be sprayed in a controlled manner.

• HYDROPULSE® SPRAY NOZZLES



Electric Hygienic
Food-Grade Design



Pneumatic
Design



**XA AIR ATOMIZING
NOZZLES**



**SAM AIR ATOMIZING
NOZZLE**

CUSTOM SPRAY FABRICATIONS

• SPRAY BARS & MANIFOLDS

- Achieve uniform spray coverage across wide areas
- Common for conveyor coating applications
- Optimize liquid flow, air flow, and nozzle placement

• HEADERS

- Multiple nozzle arrangements
- Common for area distribution
- Branched or ring designs

FLEXFLOW™ SPRAY CONTROLLERS



FLEXFLOW 1000 SPRAY CONTROLLER

Program two zones of unique precision spray control with up to six nozzles in each zone – or synchronize up to twelve nozzles.



FLEXFLOW 2000 PREMIUM SPRAY CONTROLLER

Provides ultimate system flexibility by managing up to 20 spray nozzles in up to 20 independently controlled spray zones. Auto-adjust duty cycle to match conveyor speed in each zone.



CLEANING & SANITATION

EQUIPMENT & TANK WASHING CLEAN IN PLACE (CIP) SOLUTIONS

The automated cleaning of tanks, drums, totes, and other vessels is a common practice in the food and beverage industries where a highly effective cleaning system is required to maintain hygienic standards, provide consistency across batches, and reduce downtime. Tough residues, tank size, clogging, water optimization, and chemical consumption are a few of the challenges considered in tank cleaning applications. Reducing water consumption is a key point of concern for many manufacturers.

OPTIMIZING CLEANING CYCLES

Any cleaning action has four elements: mechanical action, heat, chemical action, and time. Overall fluid consumption is a function of the time and chemical action components. The choice of tank cleaning head will dramatically affect the mix of these elements. Optimizing your tank cleaning systems to reduce chemical or water use involves understanding how each tank cleaning head affects this mix.

CUSTOM SPRAY LANCE FABRICATIONS

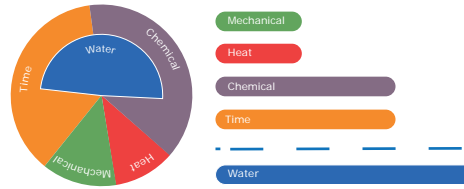
BETE spray lances for vessel washing allow a drop-in solution for simple and easy installation, relieving the hassle of coordinating between multiple suppliers and fabricators.



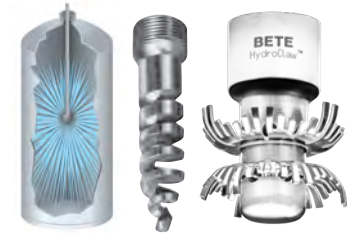
CLEANING & SANITATION

STATIC - STATIONARY TANK WASHING NOZZLES

Stationary nozzles, also known as static nozzles, have no moving parts. These specialized BETE products include the innovative HydroClaw® and spiral TW. The low-maintenance designs provide sizable free passage superior to standard static spray balls. The versatile size range and narrow form of the TW series ensure compatibility with small vessel openings.

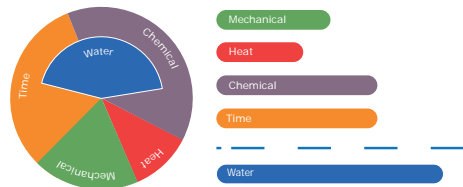


Contribution to cleaning mix for static nozzles

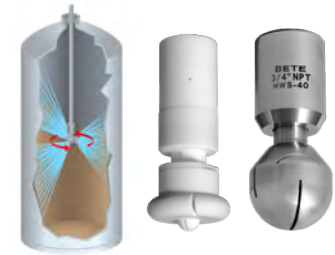


ROTARY SPRAY - ROTATING TANK CLEANING NOZZLES

Rotating tank wash nozzles, like BETE's slotted HydroWhirl® S and PTFE HydroWhirl® Poseidon® series, use the



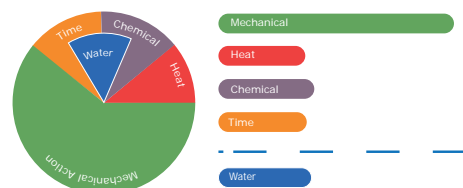
Contribution to cleaning mix for rotary spray cleaners



reaction force of the spray media to drive the rotation of the nozzle head. These provide complete 360° coverage and efficient cleaning through impact and repetition. Rotating nozzles ensure a significant increase in tank washing efficiency over static spray balls, saving time and money by reducing water and cleaning agent consumption while decreasing downtime.

ROTARY JET - TANK CLEANING MACHINES

Tank cleaning machines, such as the HydroWhirl® Orbitor and Orbitor100 models, use the spray media flowing through



Contribution to cleaning mix for rotary jet cleaners



internal gears on the body to rotate sets of high impact jet nozzles through an efficient 2-axis orbital pattern, providing complete 360° coverage. The jet pattern nozzles utilized on these assemblies provide significantly more impact and impingement force than other styles of tank washing nozzles, making them ideal for hard to clean residues and larger vessels.



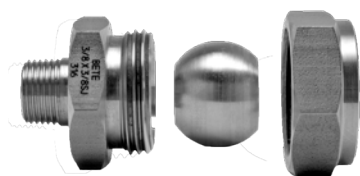
CLEANING & SANITATION

EQUIPMENT & PRODUCT WASHING CIP SOLUTIONS

A wide range of products and surfaces need cleaning in food production plants, whether cleaning the actual food products or washing the production environment itself.

Impact washing is the process of distributing water or other cleaning fluids over an object to remove contaminants. Installation of the right nozzles significantly improves this washing process compared with pouring water or submersion, by consistently providing a directed spray to maximize the fluid impact and use of cleaning media with uniform coverage for repeatable results. High volumes of cleaning fluids or high operating pressures can be used to maximize the impact of the washing process for hard to clean residues.

BETE's Engineers can assist in advising on the appropriate nozzles and potential nozzle connections to optimize your cleaning process. Need a header, spray bar, or manifold to improve coverage distribution? Collaborate with our skilled team of fabricators to customize your CIP assembly.



- For custom alignment without expensive piping changes, SJ Swivel Joints provide flexibility in nozzle positioning from 30° to 45°.



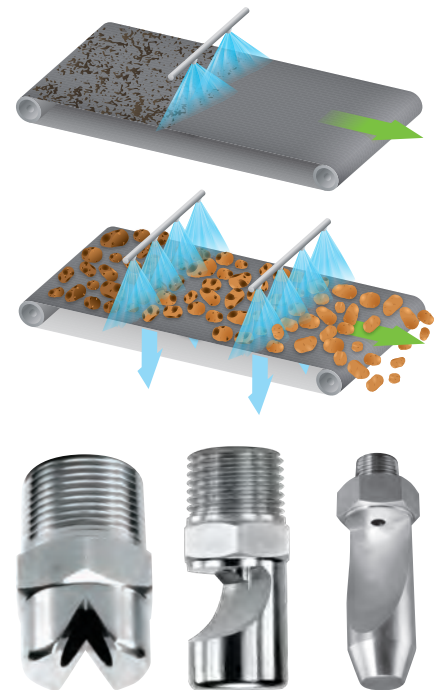
- For processing points where a range of nozzle patterns would be effective depending on the process, BETE's EZ Change Quick Connection System ensures nozzles can be changed in seconds without tools, providing efficient, automatic alignment. Sanitary EZs are available with weld connection and no knurling.



CLEANING & SANITATION

CONVEYOR CLEANING & PRODUCT WASHING

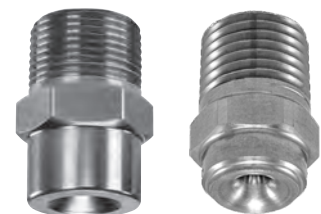
Targeting spray and spray impact are important factors in conveyor and product washing. Spray needs to be targeted at a range of relative to high impact, depending on the substance being cleaned off. Directional nozzle systems arrange nozzles on a spray bar and will direct a line of high impact spray at the product or conveyor system below. Flat fan spray nozzles, like our NF, deliver relatively high impact sprays, while “spoon” or deflector style fan spray nozzles, like our Extra-wide Angle FF or Narrow Fan SPN, provide higher impact cleaning. In some situations, full cone style nozzles may offer a more appropriate rinsing coverage.



FILLER CLEANING

Filling describes the process where food and beverage receptacles - commonly bottles, cans, and other containers - are filled with the food or beverage being processed. Product overspray is an expected consequence of filling processes, so regularly scheduled cleaning of the process area and equipment is required. Installed filler cleaning systems drastically reduce downtime, are more economical, and less labor-intensive than traditional manual cleaning. BETE offers a versatile range of nozzle components that are optimal for filler cleaning installations.

- Recommended nozzles for Filler Cleaning Systems include full cone low-flow spray nozzles such as the WL Whirl design and the MPL Maximum Free Passage clog-resistant design, as well as Flat fan spray patterns like our NF high-impact design.



- Sanitation of bottles and other food or beverage receptacles is a common sequence in filling processes. BETE's Narrow-Angle WL or Straight Jet NF are excellent options for bottle washing applications.



SANITIZING & STERILIZATION APPLICATIONS

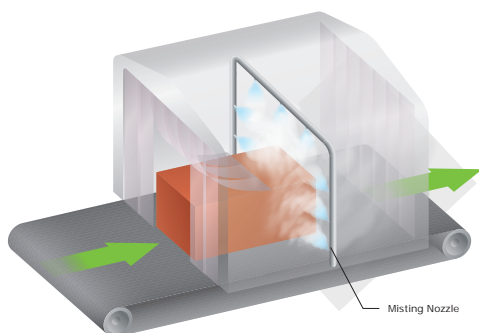
A wide range of products and surfaces need cleaning in food production plants. This can be cleaning the actual food products, sanitizing worker's hands and clothing, or washing the production environment itself.

CHALLENGES: ATOMIZATION AND DISTRIBUTION

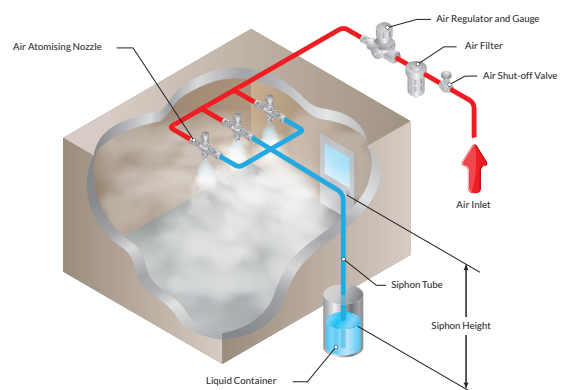
Very finely atomized sprays are needed that will "fog" and be distributed across all surfaces where microbes may be present, thus sterilizing all parts of the processing plant – even if beyond the line of sight to the nozzle itself.

SOLUTIONS FOR SANITIZING

Hydraulic misting nozzles at high pressure achieve the small droplet sizes necessary. Impingement misting nozzles are a good hydraulic option for low-flow processes. Alternatively, the use of air-atomizing nozzles delivers even smaller droplet sizes with a wide reach of spray area distribution.



Sanitizing a Conveyor with Hydraulic Misting Nozzles



Sanitizing a Production Area with Air Atomizing Nozzles System

CLEANING & SANITATION

RECOMMENDED PRODUCTS



XA AIR ATOMIZING NOZZLES

- Uses the energy in compressed air to produce highly atomized sprays at low flow rates



PJ HYDRAULIC MISTING NOZZLES

- Impingement misting designed for low flow rates

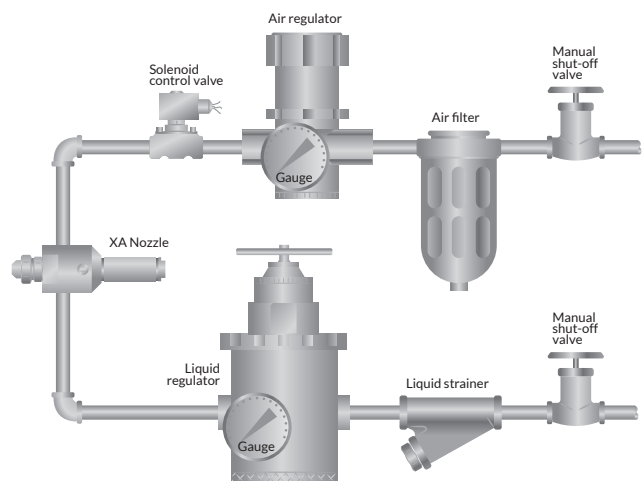


MICROWHIRL® HYDRAULIC MISTING NOZZLES

- Performance small orifice misting pattern

CUSTOM FABRICATIONS & SYSTEMS

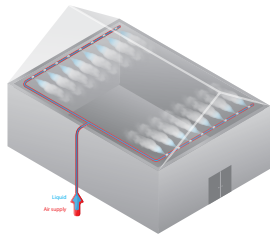
- Leveraging decades of experience with advanced engineering and manufacturing resources, BETE has grown far beyond just spray nozzles and today we offer a one-stop-shop for complete fabrications and spray system solutions. Contact us today to see how we can help you increase the performance, reliability, efficiency, and profitability of your spray process.





HUMIDIFICATION, EVAPORATIVE COOLING, & STEAM

The fine atomization of water produced by misting or fog pattern spray nozzles is effective at increasing humidity levels. The small water droplets produced by these nozzles are capable of evaporating quickly, even at normal ambient temperatures, thus increasing the amount of water that is present in the air. This evaporation of fine water sprays can also reduce the temperature of the air, depending on the amount of water added and the overall change in humidity.



- Humidifying storage space
- Humidify proofing and baking ovens
- Evaporative cooling of process areas – such as air inlet cooling
- Steam – a moist heat cooking method, where nozzles deliver precisely controlled moisture to interact with temperatures in oven systems



MICROWHIRL MISTING NOZZLES

Simple operation, requiring only water pressure to achieve outstanding atomization for efficient humidification at low flow rates.



PJ IMPINGEMENT NOZZLES

Impingement nozzles provide some of the finest atomizations of any nozzle type for lower flow rate applications making them ideal for many humidification applications.



XA AIR ATOMIZING NOZZLES

Air-atomizing nozzles provide fine atomization and high turndown capabilities ideal for humidification applications. The compressed air utilized to atomize the water can significantly increase the throw and coverage of these nozzles over traditional hydraulic misting nozzles.

AIR BLOW OFF

The removal of dry waste products from conveyors or other parts of the food manufacturing process can be achieved with air blow-off nozzles. These nozzles produce highly directed streams of air to any loose debris.

Alternatively, these nozzles can be used to create “air walls” that will prevent the product from passing through. The fast-moving air currents from a protective curtain that will contain any stray loose product.

Compressed air is especially good at clearing a liquid or residue off surfaces after deluge cooling or pasteurization. Irregular shapes and sized objects can be dried or air washed by air nozzles without special tooling or fixtures.

FINZ® AIR NOZZLES

Controlled, wide, uniform distribution and high-impact coverage of compressed air – includes efficient airflow rates with unique eductor features. Available in a rugged construction of Ryton® PPS.



FF FAN NOZZLES

Extra-wide flat fan spray angle for operating air or steam.
Contact BETE about airflow data.

Custom air and steam distribution nozzles are available upon request – contact BETE's Applications Engineering team for more information.

MIXING

Mixing or blending fluids ingredients is common in the food processing sector and is traditionally done using mechanical mixers or agitators. Keeping product

homogenous – a key challenge in mixing applications is preventing separation and sedimentation of products which may

cause batches to be ruined. Eductor nozzles, like the BETE TurboMix®, reduce the settling of suspended particles, improve circulation, and maintain uniform liquid characteristics. They offer a lightweight, inexpensive alternative to mechanical mixing methods.



SPRAY DRYING

Create powder products, such as milk, cheese, and proteins, out of solutions and slurries by spraying into a heated chamber. Spray drying is unique in its ability to produce powders with specific particle size and moisture content without regard for the capacity of the dryer and the heat sensitivity of the product. This flexibility makes spray drying the process of choice for many food processing drying operations.



COMMON SPRAY DRY FOOD PROCESSING PRODUCTS



- Powdered Cream or Milk
- Instant Coffee
- Pet Foods
- Powdered Cheese
- Plant Flavors & Proteins
- Carbohydrate Products
- Whey and Protein
- Yeasts
- Baby Formula
- Eggs

SOLUTIONS FOR SPRAY DRYING

BETE produces a variety of hydraulic and air-atomizing nozzle types, features, and materials to fit your spray drying applications requirements. Consistent performance and quality allow for the production of high-quality spray-dried products through constant particle sizes with even moisture content. High strength, wear-resistant, and high-temperature material options allow for long service life and safe operation within the high pressure, high temperature, and abrasive applications found in spray drying applications.

TWIST & DRY®

The Twist & Dry® series of nozzles are designed and developed for spray drying applications across various industries, with the dryer operator specifically in mind. The patented locking system locks the swirl and orifice components into place prior to installation on the spray lance, eliminating many of the hassles associated with replacing wear parts and allowing for easier installs. Through continuous development and innovation, BETE offers solutions within the series for low-pressure, high-pressure, high-temperature, high fat-content, and abrasive media applications.



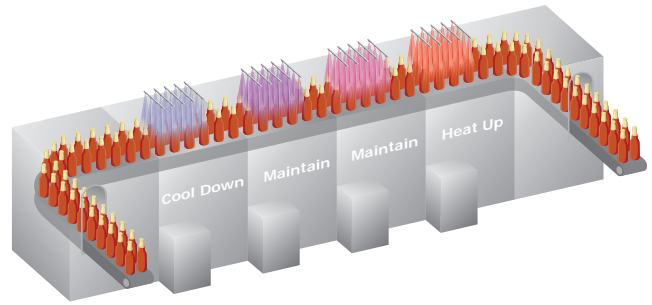
XA AIR ATOMIZING NOZZLES

XA air atomizing nozzle set-ups with external-mix designs provide independent control of flow rate and drop size. Available with clean-out and shut-off capabilities. Ideal for low flow rates and higher viscosity spray media. Internal mix designs are available.

VISIT WWW.BETE.COM/APPLICATIONS/SPRAYDRY & DOWNLOAD OUR SPRAY DRY MANUAL FOR A COMPREHENSIVE OVERVIEW OF SPRAY DRYER PROCESSES & APPLICATIONS

PASTEURIZATION

Pasteurizing spray tunnels utilize multiple nozzles to deliver water that raises, holds and then cools the temperature of the products as they move along a conveyor.



CHALLENGES

The temperature of the product, particularly if in glass containers, needs to be changed gently to avoid thermal shock and cracking. Additionally, if the temperature is raised too much or held for too long, the flavor of the product may be impaired. This means that tunnels have multiple spray stages for the precise control of temperature changes.

PASTEURIZATION SOLUTIONS

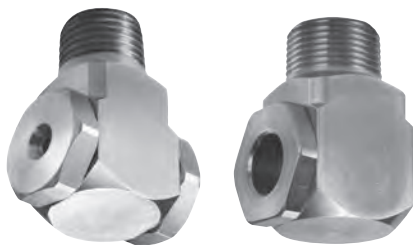
A full or hollow cone spray nozzle is desirable to reduce droplet size and so increase the surface area of the spray. This improves heat transfer. BETE whirl style nozzles provide the even coverage necessary for critical pasteurization and cooling applications. A full cone whirl nozzle creates a very even distribution of droplets. A hollow cone whirl nozzle typically creates smaller droplets as compared to the full cone versions.

AXIAL WHIRL FULL CONE NOZZLES

For even distribution over a specific surface area, consider the advanced whirl plate design of BETE's WL Low Flow Full Cone Nozzle, or, for greater free passage, consider the MaxiPass® or MPL depending on your flow rate.

TANGENTIAL WHIRL NOZZLES

Often, if space is limited, tangential nozzles offer an ideal spray orientation for pasteurization processes. BETE WTZ Nozzles offer a right-angle full cone with uniform distribution. Where a circular pattern is required, or a large area where considerable overlapping of sprays is expected, the WT right-angle hollow cone nozzles is an appropriate choice.





DELUGE COOLING & FREEZING TUNNELS

BETE provides a range of high-quality nozzles that are useful for reducing the temperature of components or products using a deluge spray. Many production processes require the product to be hot during work and then cooled back to ambient temperature. In the food processing industry, many products are packaged hot and must be cooled before storage and shipment. Common food processes that benefit from the right spray nozzle installation include:

- Chilling meat or produce before and after processing
- Cooling containers after cooking or pasteurization
- Liquid nitrogen freezing tunnels



In some specialty cooling applications, liquid nitrogen is sprayed to cool or freeze products in a time and cost-efficient manner. The extremely low boiling point of liquid nitrogen (-320 °F) allows it to maintain extremely low temperatures and high cooling efficiency in product cooling applications.

DELUGE COOLING & FREEZING TUNNELS



MAXIPASS® MAXIMUM PASSAGE NOZZLES

The design features of the MaxiPass nozzles provide high reliability when recycling cooling water or in other harsh conditions. The MPL offers the same performance features as the MaxiPass at lower flow rates.



NC FULL CONE WHIRL SPRAY NOZZLES

Available in food-grade PTFE – offering a wide range of flow rates, spray angles, connection sizes, and connection types. Lightweight and rugged with reliable, uniform coverage.



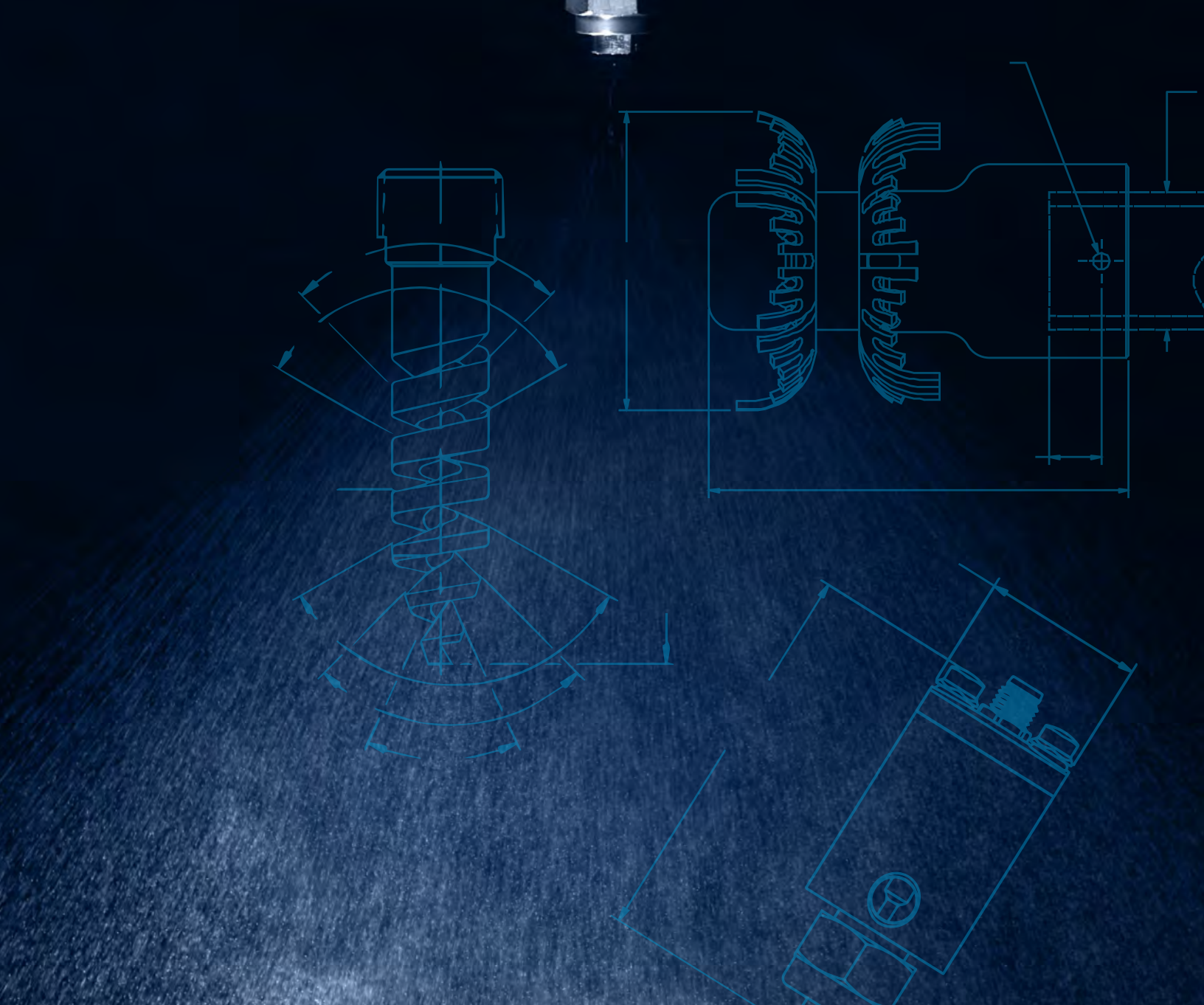
L SERIES LOW-FLOW SPIRAL NOZZLES

These misting nozzles with large free passage provide excellent atomization for efficient cooling and resist icing in cryogenic applications.



P SERIES IMPINGEMENT STYLE MISTING NOZZLES

Provides excellent atomization for efficient cooling at low flow rates.



BETE Fog Nozzle, Inc.

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Spray
Nozzles



Spray
Fabrications



Spray
Systems



Applications
Engineering



Spray
Research

