BETE®

PERFORMANCE SPRAY ENGINEERING

OPTIMIZE YOUR SPRAY NOZZLE PERFORMANCE

WITH MONITORING & MAINTENANCE







TABLE OF CONTENTS

PERFORMANCE SPRAY ENGINEERING

Spray nozzles may be a small component of complex processes, but their performance is critical to success. Spray nozzles that are not thoroughly inspected and regularly evaluated for wear or damage can cause operations to fail or lead to thousands of dollars in wasted resources. The cost of scrap resulting from quality control problems, additional chemicals and energy, unscheduled production downtime, and extra labor can quickly escalate. Most spray problems are avoidable through a simple nozzle maintenance program to check for wear and clean or replace any identified problem areas.

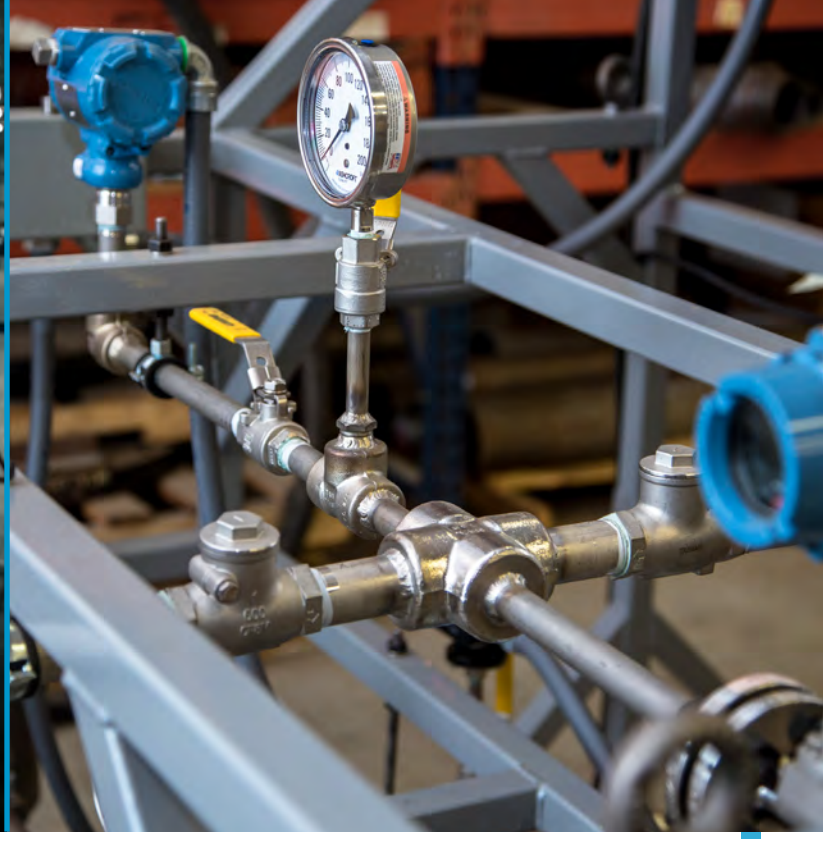
BETE's mission goes beyond just selling spray nozzles. It is to provide engineered spray process solutions that exceed customer expectations in every detail. Our patented spray technologies are quality inspected and field-proven to meet the high standards of third-party certifiers.

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.**

BETE®
PERFORMANCE SPRAY ENGINEERING

BETE ISO 9001:2015 QUALITY SYSTEMS

Spray Nozzles | Spray Fabrications | Spray Systems | Applications Engineering | Spray Research



MONITORING & MAINTENANCE

SYSTEMS COMPONENTS WORKING TOGETHER

Spray nozzles are highly engineered precision components designed to provide performance functionality for a particular goal such as cooling, coating, or cleaning. The nozzle's quality ensures a complete spray system with multiple components (pumps, filters, valves, piping) will operate effectively and efficiently.

DAMAGE

Not only can damage, wear, corrosion, or clogging affect the nozzle's performance (system effectiveness) – it also affects the other components of a spray system, potentially resulting in increased energy costs, wasted resources, and unscheduled downtime.

MAINTAIN PERFORMANCE & REDUCE WASTE

SYMPTOMS

Pumps can run off their curves, filters can fail, instrumentation becomes unpredictable, and equipment can get damaged. Each scenario is likely to result in unscheduled maintenance, higher energy costs, process waste increases, and impact on the manufactured products' quality.

MAINTAINING & CLEANING NOZZLES

- Soaking/washing with appropriate cleaning fluids is the best method to clean without damaging the nozzle.
- Always clean tips with a soft instrument such as a cleaning brush.
- Never use sharp instruments such as probes or picks. Even a tiny nick in the orifice will result in degradation of spray performance.
- Ultrasonic cleaning baths can help clean small nozzles and orifices.

EXAMPLE OF NOZZLE WEAR OR EROSION (BETE NOZZLE P/N TF56XPN)

Note: 10% increase in orifice diam can result in more than a 20% increase in nozzle flow rate	
Note: 20% increase in orifice diam can result in more than a 50% increase in nozzle flow rate	
A header with Qty (20) x TF56XPN nozzles operating at 20 PSI (NEW)	(20) x 91.2 GPM = total 1824 GPM
A header with Qty (20) x TF56XPN nozzles operating at 20 PSI (10% orifice wear)	(20) x 20% increase = new total 2188 GPM
A header with Qty (20) x TF56XPN nozzles operating at 20 PSI (20% orifice wear)	(20) x 50% increase = new total 2736 GPM

EVALUATING NOZZLE PERFORMANCE

VISUAL INSPECTION OF NOZZLE

Visual inspection can show signs of damage that may have occurred during installation or standard operation. Though not always evident, a quick visual inspection can usually identify wear or corrosion.

VISUAL INSPECTION OF SPRAY PATTERN

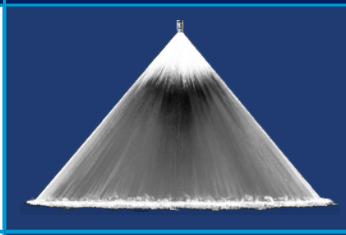
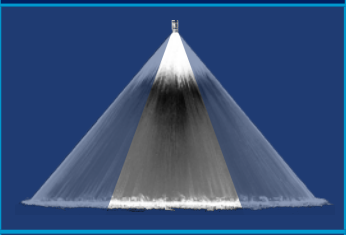
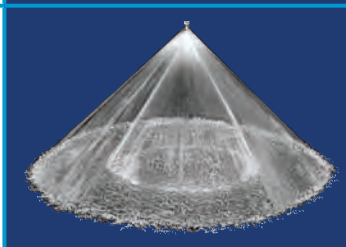
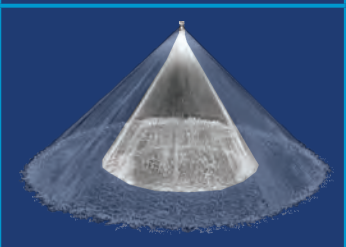
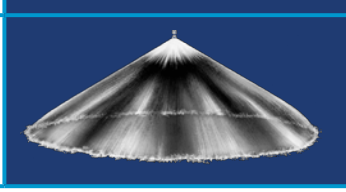
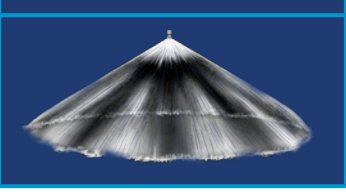
Streakiness, heavier sections, fluttering, or skewed/lopsided spray patterns can all indicate that a nozzle is not operating as designed or intended.

MONITOR FLOW RATE & PRESSURE

The flow rate and operating pressure drop of the nozzle are directly related. If these values change from nominal, it can indicate issues with the nozzle like clogging or excessive wear.

MONITOR SYSTEM PERFORMANCE & EFFECTIVENESS

Changes in overall system performance, such as temperatures, pollutant levels, and coverage, can indicate nozzle issues like damage, clogging, or wear.

Type of Nozzle	Normal Spray Pattern	Poor Spray Pattern	Signs of Poor Performance
Flat Fans			• Flow becomes centered • Coverage angle is reduced
Full Cones			• Liquid centers in cone • Coverage angle is reduced
Hollow Cones			• Pattern is not precise • Flow rate fluctuates

BETE ENGINEERING & LAB SERVICES

BETE's extensive resources and 70 years of experience are available to help you solve existing spray problems and achieve process improvements. Our facilities include a spray laboratory, state-of-the-art production machinery, rapid prototyping, computer modeling, an in-house foundry, and a staff with decades of combined experience in diverse fields.

BETE Applications Engineers can assist you when your application requires a custom-designed nozzle, involves precise spray performance, or unusual operating conditions. Our engineers have many years of experience in nozzle design and process specifications.

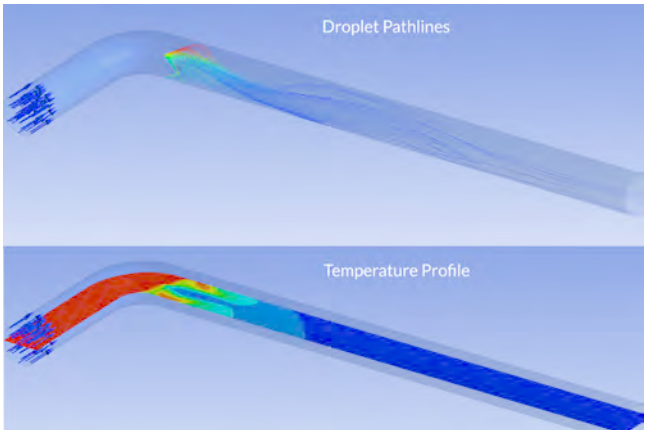
SPRAY LABORATORY

BETE's dedicated spray laboratory analyzes and characterizes sprays, spray nozzles, and their uses.

We measure common spray characteristics, including flow rate and pressure, liquid distribution, droplet size, spray angle, and droplet velocity. Our team can build physical models of your process to help diagnose problems or select the best nozzle application.

Examples of physical tests of nozzles:

- Flow visualization in pipes, ducts, and tanks.
- Applications-based testing to measure the effect of a spray either in or on a system. These include such things as impact, coating uniformity, reach, wind drift, and spray effectiveness.



COMPUTATIONAL MODELING

BETE offers computer modeling of sprays and processes using ANSYS® FLUENT® computational fluid dynamics software (CFD). Modeling a spray process can help select nozzles, operating conditions, and positions when designing or improving processes. It can also identify the cause of problems in an existing operation. Examples of our modeling include droplet trajectories and evaporation of sprays in ducts, wetting of walls in furnaces, and mixing chemicals in pipelines.

Computer modeling, combined with physical testing in our laboratory, gives you confidence in your system design or problem solution.

SPECIAL TESTING

Besides characterizing nozzles, BETE has set up many unusual tests, including:

- Study of erosion patterns in fluidized beds
- Pattern distribution of fire protection nozzles with simulated wind
- The spatial concentration of respirable droplets
- Comparison of flow rates and spray patterns using oil and water
- Effectiveness of tank washing nozzles
- Seal leak tests to ASTM A515 using helium
- Life cycle testing
- Strain gauge tests for pressure vessels

BETE NO-COST SUPPORT SERVICES

FREE SPRAY NOZZLE & SYSTEM AUDIT

On-site consultation to review your spray process, evaluate nozzle performance, and assist in optimizing system performance.

NO-COST NOZZLE TESTING & EVALUATION (REASONABLE QUANTITY)

Conducted in our spray lab. Includes a test report generated to compare evaluated wear to the original nozzle specification.

For more details on either option, please contact us at **sales@bete.com** or **413-772-2166, Ext 5**.

BETE®
PERFORMANCE SPRAY ENGINEERING

70
1950
2020

BETE Fog Nozzle, Inc.
50 Greenfield Street, Greenfield | MA 01301 USA
413-772-0846 | www.BETE.com | sales@BETE.com

Spray Nozzles
Spray Fabrications
Spray Systems
Applications Engineering
Spray Research