



# Case Study

SOLVING INCONSISTENT INJECTION OF  
LIQUIDS WITH SPRAY LANCES  
CHEMICAL PROCESSING

## CHEMICAL SPRAY LANCE SOLUTION



Quills are not always the best method for injecting chemical inhibitors where spray distribution is critical. For these applications, fabricated spray injectors with a nozzle produce more accurate results for spray injection.

### ► PROBLEM: INCONSISTENCIES IN PROCESS RESULTS

A predominant chemical customer was using a quill, which does not contain a nozzle, for injecting a liquid DMDS (Dimethyl Sulfide) into their process. DMDS works as an effective solution for sulfiding hydroprocessing catalysts. The customer was having difficulties controlling the flow and achieving a balance of liquid/gas, which caused inconsistencies in their process results. Build up of liquid in the pipe can lead to corrosion over time, damaging downstream equipment.



### ► SOLUTION: FABRICATED SPRAY INJECTION LANCE

For this application, BETE proposed a lance with a two-phase nozzle to inject the liquid DMDS. DMDS has a high sulfur content and low decomposition temperature. Because the injectant's overall composition was primarily gas with an approximate weight of 95%, there was still a concern that the liquid injection would not reach the nozzle and remain inside the pipe.

To overcome this, BETE engineers designed a lance with an internal liquid pipe leading directly to the nozzle. The lance utilized the MPL full cone nozzle series because the vane's design acts as a static mixer for two-phase flow requirements. Fabrication of a custom nozzle end adapter with a relatively tight clearance increases gas velocity to the nozzle to ensure liquid entrainment and promote mixing as it passed through the nozzle vane.







# Delivered Performance

For specific process conditions where spray distribution is critical, quills are not always effective. A custom fabricated spray injection lance is required for these types of applications so that inhibitors can distribute as evenly as possible to prevent corrosion and scale build-up. In this case, our engineering experts were able to select the appropriate nozzle size based on orifice diameter, using BETE's two-phase flow estimate capabilities. The lance was custom designed and fabricated in-house per ASME B31.3, and the customer received vibration calculations per ASME PTC 19.3 TW.

## ADVANTAGES OF BETE SPRAY LANCES

- In-house fabrication
- Engineering consultation
- Designed to meet specific process conditions
- Certified Piping ASME B31.3, B31.1
- In-house casting, wide array of exotic materials
- Certified Welding ASME B&PVC, Section IX
- NACE Compliance



## SPRAY DESIGN & FABRICATION EXPERTS

- ISO 9001:2015 Certified
- The ability to solve unique and complex process challenges
- Trusted nozzle design and manufacturing with consistent quality assurance

BETE is an innovative global leader, developing and manufacturing specialized spray technology solutions.

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