



THE  
**SPRAY NOZZLE**  
PEOPLE

# Case Study

## MARINE FGD SOLUTION



01273 400092

[www.spray-nozzle.co.uk](http://www.spray-nozzle.co.uk)

When heavy fossil fuels are used in combustion processes to run ship engines and boilers, they release SO<sub>2</sub> or SO<sub>3</sub> as part of the exhaust gas. These sulphur oxides react with air and water to form compounds such as sulphuric acid (which causes acid rain) that have the potential to negatively affect human health and the environment. Gas scrubbing is one means of neutralising harmful emissions and assuring compliance with IMO regulations.

### ► PROBLEM:

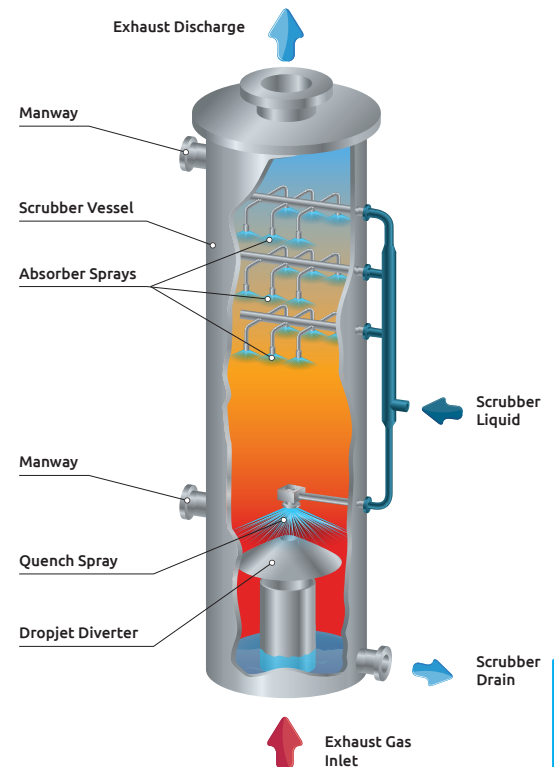
One of Europe's leading engineering services companies consulted SNP to find spray nozzle solutions for scrubbers to be used on container ships for flue gas desulphurisation (FGD). The International Maritime Organisation's (IMO) regulations to achieve an 80% reduction in sulphur emissions by January 2020 mean that ships must use low sulphur fuel or find 'equivalent' means of achieving the drastically lower emissions, one of which is by scrubbing the gas to 'clean' the emissions before they are released.

### ► SITUATION

The client was seeking spray nozzles for the gas quenching section and absorber nozzles for the scrubbing tower. They had very specific flow rate, droplet size requirements at quite a low liquid pressure.

In the quench section of the scrubber, the nozzles needed to reduce the temperature of the hot flue gas to reduce its volume and thus increase the residence time further up in the absorber. In the absorber zone of the scrubber, complete coverage of the gas stream with no bypass and sufficient residence time was of key importance. The client needed a nozzle which created drops that were small enough to give the large surface area required but not so small that they were carried away by the counter current of the gas.

As the flue gas is often corrosive and the scrubbing fluid is highly alkaline, selecting the appropriate corrosion and wear resistant material was also essential.





## WHY CHOOSE SNP FOR YOUR GAS SCRUBBING NEEDS?

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

With SNP you get our world-class customer support from an industry pioneer who has been creatively solving problems for many decades.



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## The Solution

SNP engineers took the customer's pressure drop and flow rate requirements and, using our unique droplet analyser, which provides fast, accurate dynamic droplet size analysis, and our unique high speed 'patternator' for liquid distribution measurement, specified the nozzles that would deliver the precise spray coverage, uniformity, density and droplet size needed.

SNP proposed a mixture of TF and MaxiPass (MP) nozzles in the absorber zone in 904L stainless steel. These ensured the correct droplet size, unit flow rate and gas coverage.

In the quench section, MP nozzles in Hastelloy C were chosen for their flow rate and droplet size.

SNP's TF nozzles allow for high discharge velocity, high energy efficiency and fine atomisation at the lower pressures available. The original spiral nozzle, the TF is also clog resistant.

The MP nozzles are also highly energy efficient and, despite the fine atomisation of the spray, allow for highly reliable spray performance under even difficult and abrasive conditions.

### ► CHALLENGES

- modelling data to find best droplet size
- increasing residence time with low flow rate
- finding best materials for the harsh environment

### ► THE PRODUCTS



MaxiPass  
904L SS & Hastelloy



TF  
904L SS

### ► ADVANTAGES

- expertise to model optimal spray characteristics using customer data and requirements
- a range of nozzles in a range of materials
- client met IMO emission reduction

Orbitor Eco