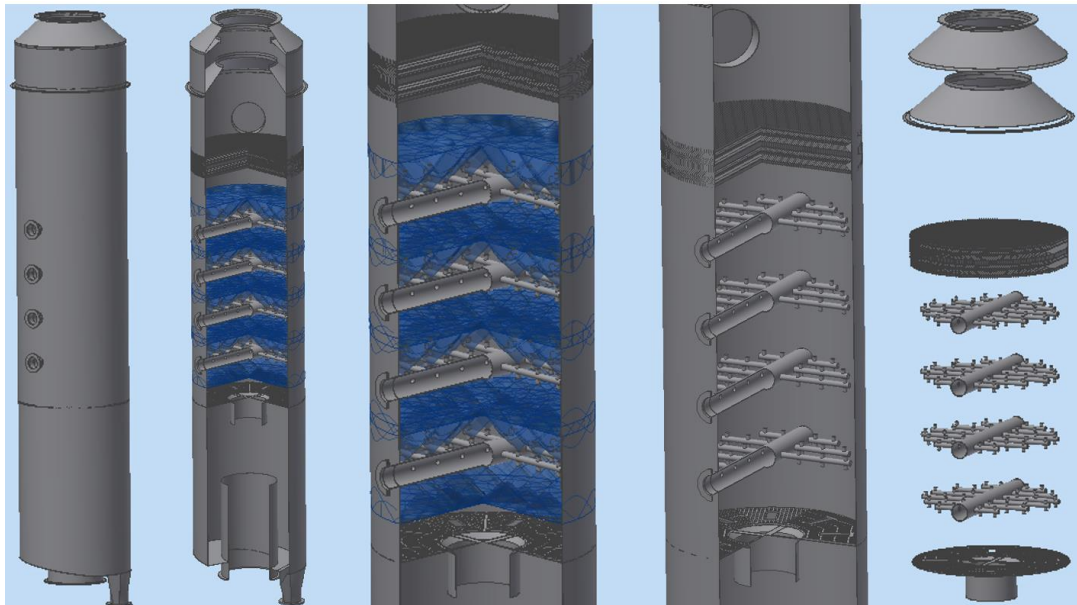


Client: Primarine GmbH

Project: Baseline study and measures for optimizing existing scrubbers on cruise ships

Services: Baseline study, concept development



General

As part of the project, open-loop scrubbers were examined on several cruise ships. The aim was to prepare a status report on the exhaust gas cleaning systems (EGCS) installed, describing the mode of operation, identifying problems, and identifying potential for optimization.

Scope of services provided by T&N

- Review of the rating and design of the scrubbers concentrating on the two areas
 - Nozzle banks including nozzles
 - Demister
- Review of the pump ratings
- Evaluation of the operating data of the entire EGCS
- Identification of problems in operation
 - Emissions in exhaust gas (carry over)
 - Emissions in discharged scrubbing water
- Identification of corrosion problems and development of measures for improvement
- Development of measures for enhancing the separation capacity and reducing energy consumption

Findings and recommendations

The main problems in operation proved to be wet and soot carry-over with the exhaust gas, resulting in high power consumption of the pumps, as well as the carry-over of oily components in the extracted, diluted scrubbing water.

The following proposals were made for improvement and the components were rated accordingly:

- Replacement of demister to avoid wet carry-over and reduce the pressure loss
- Replacement of the nozzles while retaining the existing pumps to provide a cost-effective solution, or alternatively, the complete conversion of the nozzle banks including the replacement of the nozzles and pumps (Scrubber Pump und Dilution Pump)
- Treatment of the used scrubbing water (open loop water treatment)

Outlook

The measures are to be implemented in the course of 2019.