

**Title:** Steerable Nozzle for DP Operations

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### **Abstract**

The correct main propulsion system for DP operating vessels is essential to fulfil the high requirements for DP operation. Vessels today are equipped with wide variety of propulsion systems such as azimuth drives, propeller-rudders drives or conventional shaft arrangement.

The well-known combination of a CPP propeller in a nozzle in combination with a high lift rudder provides excellent vessel operation and has very good performance in bollard pull, response time, and cruise behavior. Nevertheless, to fulfil the redundancy requirement for DP2, this system still requires two aft tunnel thrusters to get system approval. The side force which can be produced by high lift rudder in this configuration is limited to a certain point and is not sufficient to adequately keep the vessel in position.

The newly developed Becker Steerable Nozzle (BSN) showed excellent performance during the development in CFD and model tests. In comparison to a high lift flap rudder, the BSN is able to produce the same side force with only half the engine power on the propeller. These results raised the questions whether it is possible to fulfil the high requirements from DP2 with only one aft tunnel thruster when using the Becker Steerable Nozzle. To prove this assumption a complete DP2 study at HSVA<sup>1</sup> was performed with a PSV design from a Singapore ship designer.

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<sup>1</sup> Hamburgische Schiffbau-Versuchsanstalt