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Autonomous Shipping

SECURE POSITIONING

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SECURE POSITIONING

The Dutch Damen group is equipping the "Windcat Elevation" series of Walk-to-Work Commissioning Service Operation Vessels (CSOVs) with the new SCHOTTEL RudderPropeller Dynamic (SRP-D).

With unprecedented performance, the new "RudderPropeller SRP-D" from German propulsion and steering specialist SCHOTTEL meets the increasing requirements for the efficient use of walk-to-work (W2W) vessels. The performance and modularity of Bachmann's M200 control system play a key role in this success.

Seventy-five years ago, Josef Becker, founder of the SCHOTTEL shipyard, presented a brand-new invention: an innovative maritime propulsion and steering unit combining rudder and propeller – the rudder propeller. The novelty was that the entire propeller could rotate 360 degrees to determine the direction of the ship's propulsion, making a separate rudder redundant.

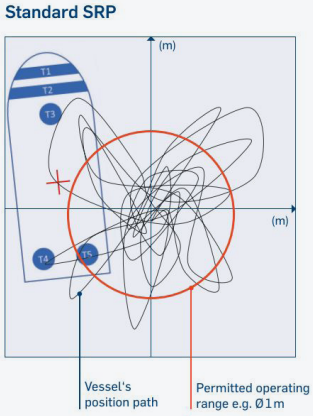
Since then, this propulsion type has been continuously optimized and installed in thousands of ships, especially those requiring maximum maneuverability, high bollard pull, and maximum steering force. Examples include harbor tugs and service vessels, such as those used for the construction and maintenance of offshore platforms and wind turbines. With the new "RudderPropeller SRP-D," (The "D" stands for "dynamic"), SCHOTTEL has a system to meet increasing demand for the efficient use of Service Operation Vessels (SOVs).

Precisely positioned

SOVs, often referred to as "walk-to-work vessels," enable the safe and efficient transfer of personnel and materials between offshore platforms and service bases on land. These vessels are equipped with gangways and other features designed to help provide a direct and stable crossing between the ship and the platform. A Dynamic Positioning System (DP) makes this possible. The DP automatically steers the vessel and maintains a stable position, even in wind and waves, without the use of anchors or mooring lines. This computer-controlled system receives feedback from numerous sensors, which record movement in every spatial dimension, as well as wind and sea conditions, currents, and many other parameters. The system then calculates necessary propulsion and steering commands, ensuring precise positioning and enabling operation during increasingly challenging conditions.

» The dynamics of the rudder propeller are crucial for the ship's positioning accuracy.«

Jan Glas
Director of Product Management
& Business Intelligence
at SCHOTTEL



Thanks to shorter response times, external forces such as sea conditions, wind, and currents can be addressed more quickly and precisely. This improves the ship's positioning accuracy.

Speed counts

"Simply put, our rudder propeller receives steering commands from a computer, not a control lever," says Jan Glas, Director of Product Management & Business Intelligence at SCHOTTEL, describing how the two systems cooperate. "The thruster's dynamics are crucial for the ship's positioning accuracy because the ship must be in the right place quickly." This is especially important for W2W transport to offshore wind turbines because, unlike a single oil rig, a wind farm has many turbine locations. The crew needs to be able to service as many turbines as possible during a shift, even in rough seas. The required landing time is therefore a decisive factor for efficient service operations.

A whole new dynamic

SCHOTTEL has significantly improved the dynamic positioning (DP) capability of its rudder propellers with targeted reinforcement. Thanks to an optimized control structure, the SRP-D propulsion can perform up to five complete 360° rotations per minute – more than twice as many as conventional propulsion units. Faster acceleration and deceleration of the electric motor enable rapid thrust changes in any direction. This increased responsiveness enables a quicker and more precise reaction to external forces, such as wind and current, giving the vessel greater positioning accuracy. "This reduces the footprint of dynamic positioning, while enabling us to work much more precisely, because the motion of the ship has decreased," says Glas. Additionally, the propulsion unit's propeller shaft is at an eight-degree incline. He explains: "This approach minimizes interaction between the propulsion unit and the hull, as well as opposing flow between the propulsion units themselves, significantly optimizing thrust yield and distribution." In some cases, it also reduces the ship's fuel consumption.

Performance is crucial

"The days of manual control levers are gone," says Glas. Ship control systems are now becoming integrated with third-party and higher-level control systems. However, he notes that this also makes them more dependent

on external parameters, which requires awareness and operation of a higher number of interfaces. The Bachmann M200 control system excels in precisely this area: It provides the flexibility and performance required to meet real-time, redundancy, and cybersecurity requirements. It also facilitates both necessary control speed and response to DP requirements.

Additionally, propulsion system failure could be disastrous in many situations, making the availability of these systems crucial. The systems must ensure the ship's safe positioning at all times, even in an emergency. For this reason, the entire control system is designed to be fully redundant, with hot standby, allowing seamless transition between systems.

High propulsion system loads

However, the high dynamics of the propulsion unit are only activated at low speeds. "Hydrodynamic loads that act on the propulsion unit are smaller then, so the system can handle higher inertial loads," says Glas. Steering increases structural load on the propulsion, including the shaft and steering gear. One unit weighs between 20 and 50 tons. "That's a lot of moving mass. Furthermore, spindle forces are also generated on the rotating propeller, which act as vertical moment."

Efficient change

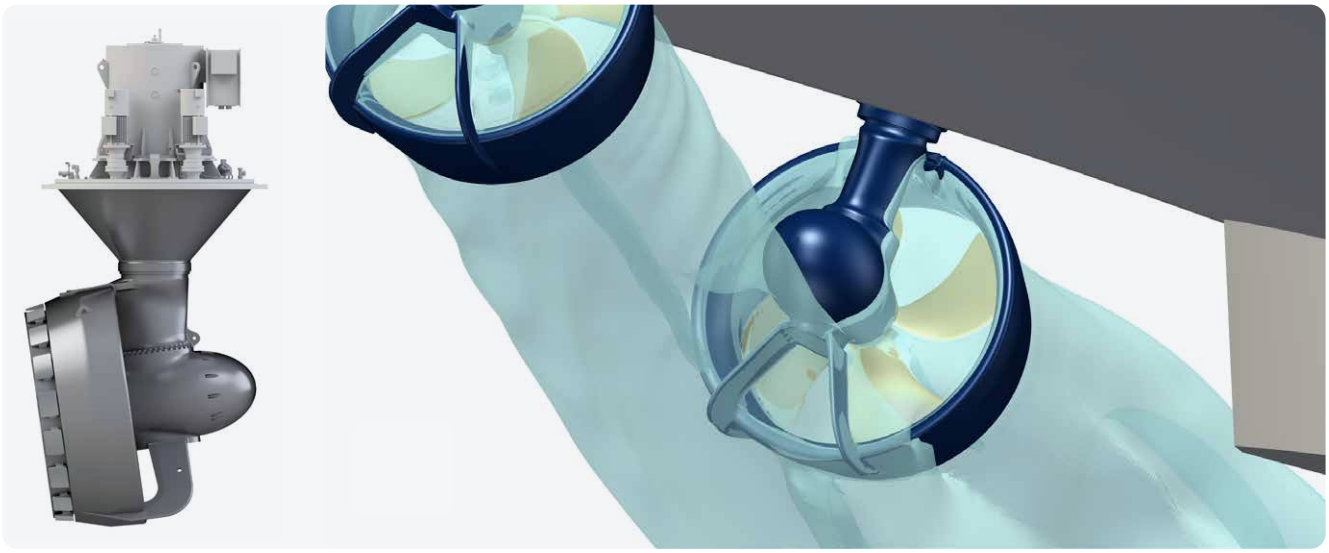
The new SRP-D rudder propeller significantly increases a ship's DP performance. A quick response to external forces also significantly reduces thrust requirements. Overall, vessels operate much more efficiently and safely, extending operating time throughout the year – a decisive advantage in constructing and operating offshore infrastructure and a step forward on the path towards decarbonized energy infrastructure.

SCHOTTEL GMBH

- Headquartered in Spay am Rhein (Germany)
- Around 100 sales and service locations worldwide
- Established in 1921
- Supplies complete propulsion systems and control systems for vessels of all types and sizes

www.schottel.de

SCHOTTEL SRP-D rudder propeller: An eight-degree propeller shaft angle minimizes interactions between the propulsion system and the hull. Thrust losses, caused by counterflow from the propulsion units, can be reduced by 30% with the propulsion system. This leads to increased thrust efficiency in dynamic positioning (DP) operation and minimizes “forbidden zones.”



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