High Performance Nozzle

The Wärtsilä High Performance nozzle is yet another development based upon the company's strong in-house propeller design know-how. It is specifically designed to increase the thrust of marine propellers, and performs significantly better than the industry standard nozzle types, such as the 19A or 37 type nozzles. The Wärtsilä HP nozzle enables the vessel's bollard pull performance to be increased by up to 5% for the same power, compared to 19A nozzles at full scale.

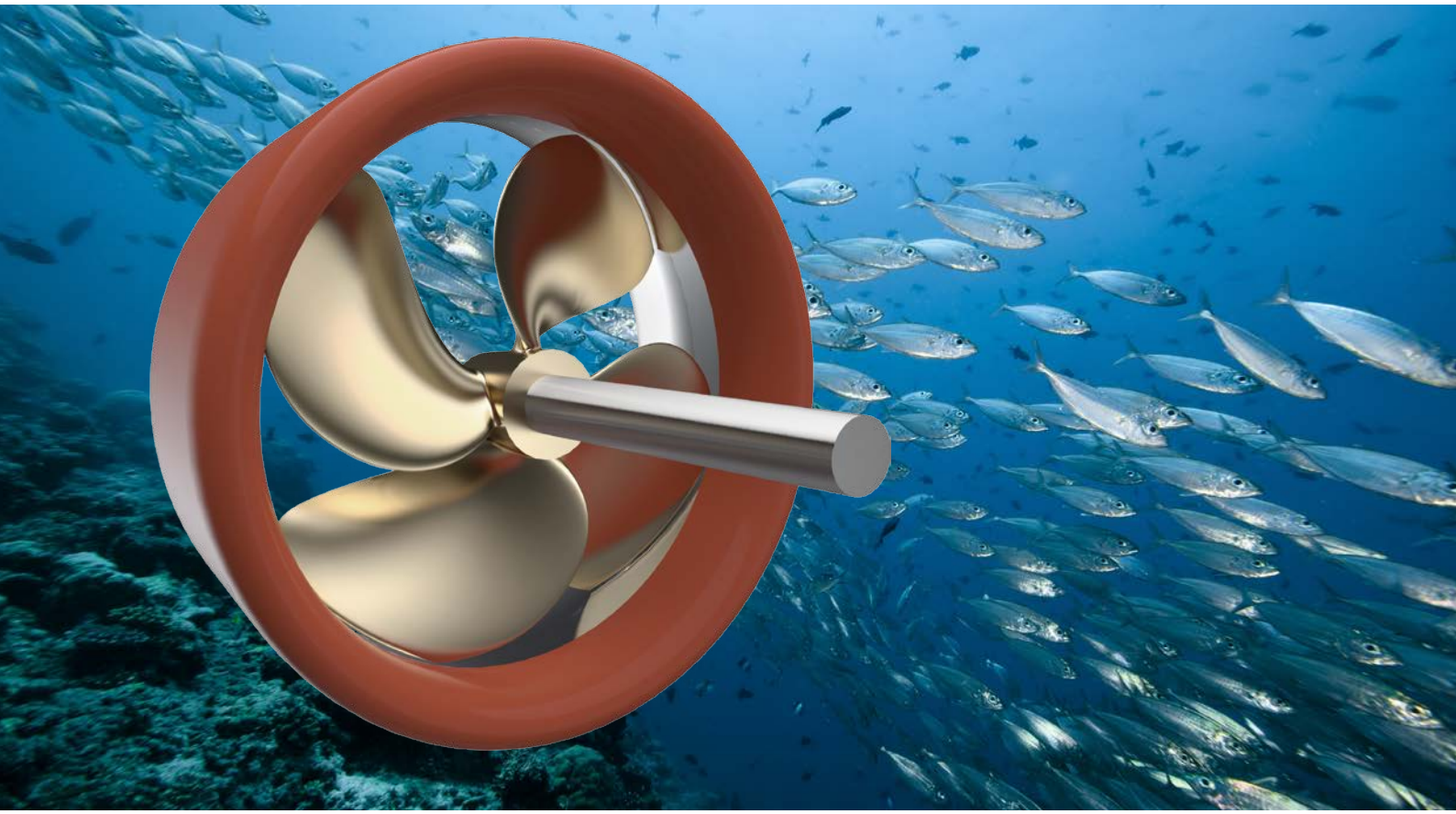
Key Benefits

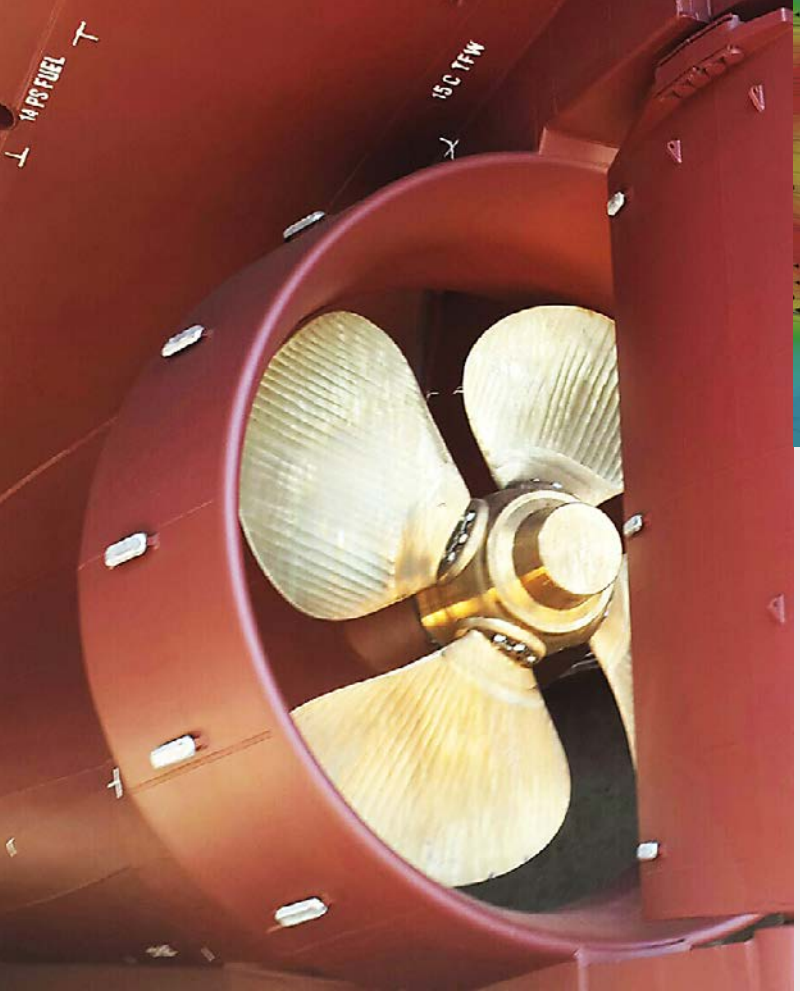
- Large bollard pull thrust at zero speed
- Improved fuel economy at design speeds
- Excellent astern performance
- Similar build-in size as other nozzle types
- Based on in-house propeller design know-how
- Optimized by use of CFD techniques

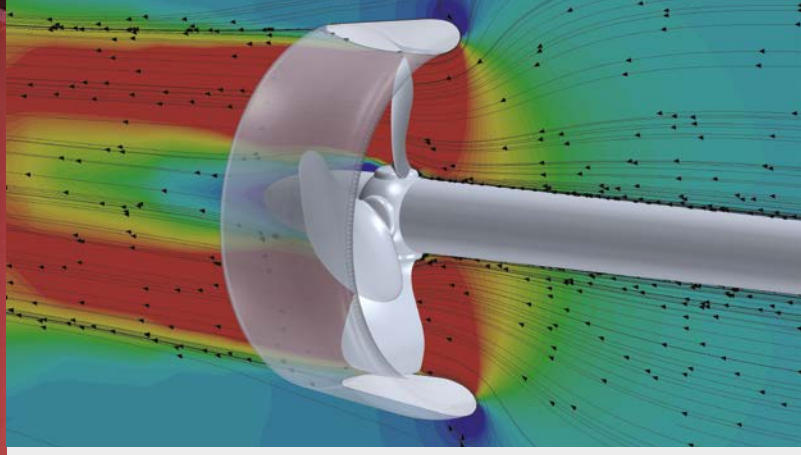
Typical Applications

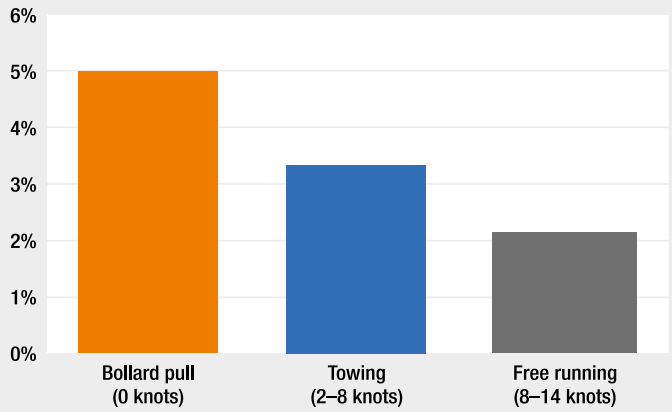
The Wärtsilä HP nozzle can be used for a broad range of vessel applications. It notably improves the delivered thrust of heavy-duty vessels, such as tugs and anchor handling vessels, in bollard pull conditions. Fishing vessels and dredgers in particular, which are typically fitted with heavy loaded propellers, will gain more thrust under these demanding conditions.

Furthermore, this nozzle can also benefit those vessels that sail at low to moderate design speeds, like inland waterways vessels and some general cargo vessel types. And importantly, the Wärtsilä HP nozzle can be easily installed as a retrofit since the build-in size is very similar to other types of nozzles.









Performance improvement with the HP nozzle compared to 19A nozzle for a typical 150 ton AHTS.

Nozzle Types in Historical Perspective

Over the years several types of nozzles, each with its own characteristics, have been developed. The 19A nozzle, introduced during the 1970s, is popular because of its cost effectiveness. The type 37 nozzle offers improved astern performance, but is also slightly more expensive to build. During the 1990s, the HR type nozzle was introduced. This nozzle has proven its advantages for both retrofit and new-building projects. Wärtsilä's continuous development in nozzle research has led to the next step in the process of improving upon earlier designs. The Wärtsilä HP nozzle is, therefore, a state-of-the-art solution that offers improved performance and valuable fuel savings.

Analysis Methodologies

Computer calculation techniques, such as CFD (computational fluid dynamics), are an important means of achieving an optimal nozzle design. At Wärtsilä performance is optimised in the design process, based on CFD flow simulations. The details of the actual 3D design are taken into account to determine the best geometry. The simulation process has been validated extensively and automated to secure commercially attractive lead times. By using the latest and most modern tools, Wärtsilä's on-going and extensive studies lead to new insights into nozzle analysis methods, better interpretation of performance results, and enhanced understanding of scale effects. This in turn allows for the optimum design of both the nozzle and the propeller, which results in the best overall integrated system performance.

Comparison to Other Nozzle Types

In comparison to a full-scale application of the 19A nozzle, the Wärtsilä High Performance nozzle will provide up to 5% more thrust in bollard pull condition*. Furthermore, the HP nozzle will produce fuel savings at the vessel's design speed. However, the annual savings depend on the vessel type and the operational profile of the vessel. The performance of the Wärtsilä HP nozzle in astern and stop modes is similar to that of the well-known 37 type nozzle, which was specifically designed for that purpose.

Matching Propeller Design

As Wärtsilä builds on decades of in-house propeller design experience, the blade design of a ducted propeller naturally becomes an integrated part of the delivered propulsion solution. The shape of the Wärtsilä HP nozzle inevitably changes the acceleration characteristics of the water mass. Thanks to the use of advanced CFD techniques, this dynamic is fully integrated into the comprehensive propeller design process.

* This is based on a full scale comparison with an optimised propeller in a 19A nozzle. If compared to the model basin results of the 19A nozzle from the 1970s, the thrust improvement from the Wärtsilä HP nozzle may very well reach up to 10%.

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