Despite the recent drop in oil prices, fuel efficiency is the most effective way of reducing operating costs. To maintain the economic profitability of the vessel, a large focus is nowadays on fuel saving devices in the broadest sense of the word.

One of the options available to improve the efficiency of the propulsion system, is to install a Wärtsilä High Performance Nozzle.

The Wärtsilä High Performance (HP) nozzle 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. By conversion of an open propeller to a propeller with a HP Nozzle, an increase of free running propeller efficiency of 15% can be reached, with a payback period of 1 to 1.5 years.

**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
INCREASED PERFORMANCES

The idea of surrounding a propeller by a nozzle is already very old. Today about 25% of all Wärtsilä controllable pitch propellers are running in a nozzle.

In an accelerating nozzle the water speed at the propeller is higher than that of the open propeller. The increase in axial velocity reduces the propeller load especially for heavily loaded propellers. This then leads to an increase in overall performance of the propeller and nozzle compared to that of a propeller alone. Additionally, the nozzle generates forward thrust caused by the pressure distribution round the nozzle, resulting in a force in the forward direction.

In comparison to a full-scale application of the Wärtsilä HP Nozzle compared to the 19A nozzle, the Wärtsilä High Performance nozzle will provide up to 5% more thrust in bollard pull condition*. Furthermore, the Wärtsilä HP nozzle will produce fuel savings at the vessel’s design speed up to 15%. However, these savings depend on the power density of the propeller, the vessel type, and the operational profile of the vessel.

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 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.

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.

* 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%.