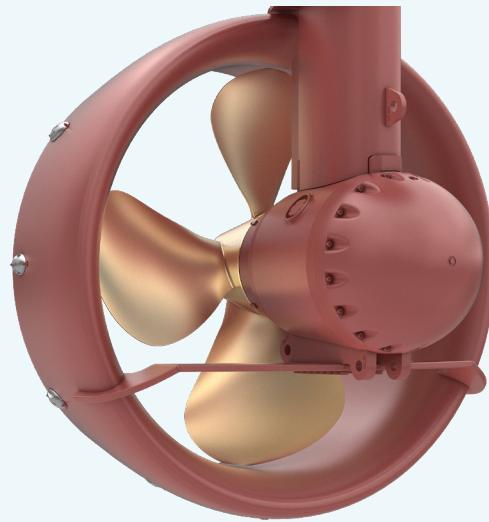


PRO-DUCT



KONGSBERG



KONGSBERG AZIMUTH THRUSTERS

New innovative nozzle design takes bollard pull to the next level

Introducing the game-changing PRO-DUCT – an innovative new nozzle and propeller design engineered to maximise the received bollard pull with our US thrusters on tugs working in the most demanding conditions.

Carefully designed alongside our A-12 propeller, the PRO-DUCT test results show excellent cavitation resistance. Developed and tested at KONGSBERG's bespoke Hydrodynamic Research Centre (KHRC) in Kristinehamn, Sweden, the PRO-DUCT is KONGSBERG's response to market demand for more powerful solutions.

Continuous development

The PRO-DUCT is the next step in the journey of ongoing research to meet the needs and expectations of the market. The new design is a natural continuum for the KONGSBERG TK Nozzle design, which has been the market leader in nozzle design for the past 15 years.

The PRO-DUCT design was developed to enhance further the efficient bollard pull concept for AZT US thrusters on tug applications, suitable for working in the most demanding conditions.

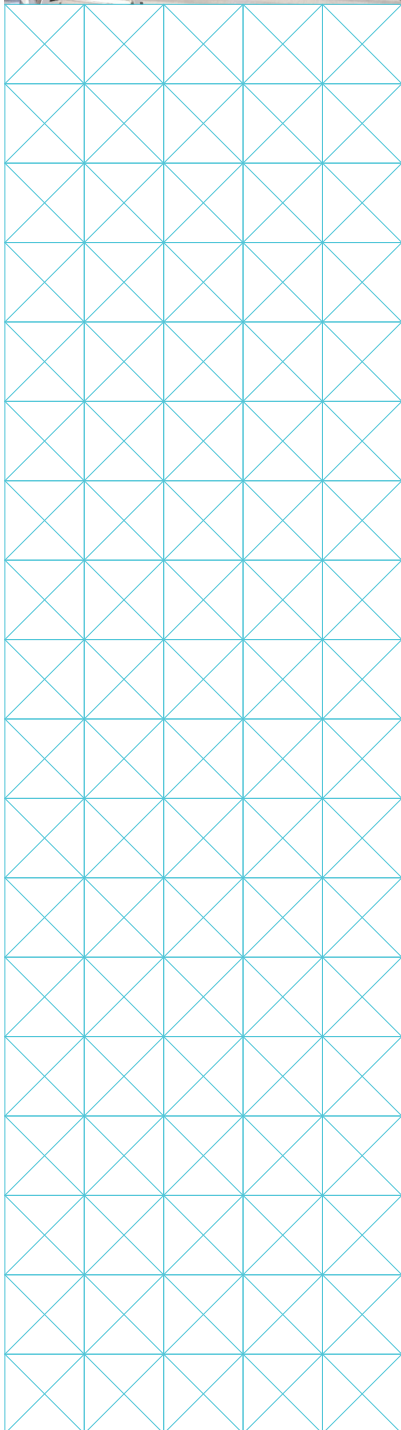
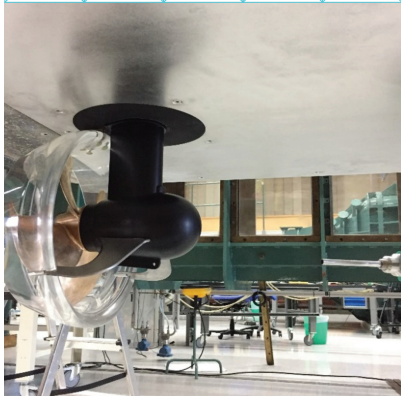
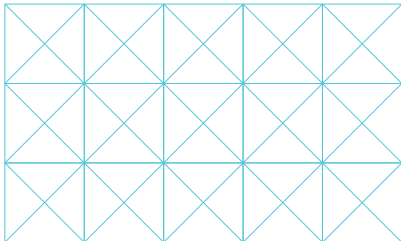
The new nozzle and optimal propeller design is developed for bollard pull application. Design concept studies included Experimental Fluid Dynamics (EFD) at KONGSBERG's Hydrodynamic Research Centre (KHRC) as well as in-house Computational Fluid Dynamics (CFD). Model and full-scale were evaluated using CFD.

Proven through a series of thorough and precise tests, the new PRO-DUCT provides significantly improved thrust over existing products on the market.

The new PRO-DUCT nozzle and propeller design will take its place alongside the existing KONGSBERG TK Nozzle, providing the market with a selection of the highest quality products to meet current or future needs.

KEY ADVANTAGES

- New bollard pull concept
- Increased thrust performance
- Excellent cavitation resistance
- Improved power saving



In-house advantage

Unlike other propulsion suppliers, KONGSBERG has its own in-house HRC Hydrodynamics Research Centre located in Kristinehamn, Sweden, which is a critical factor in our constant work of creating the best solutions to meet the needs of the market.

In this unique facility, we can test our designs in conditions accurately matching the working environment, assuring the quality of our product range.

Thanks to the KHRC and our experience gained over its 80-year-long history of operation, KONGSBERG continues to lead the development of advanced Marine propulsion systems and hydrodynamic research.

For each vessel, the design team at KHRC adapts and optimises the propeller blades to the vessel's individual specification to achieve the highest possible performance, independently if high-efficiency or low-noise levels are required.

We start the process by gaining a thorough understanding of the customers' requirements and expectations. The team collects information about the vessels' mission, operational profile and machinery system and develops the propeller design to the given conditions. The designs are analysed using the latest simulation techniques.



Comparison of received bollard pull per device with the same power

The new PRO-DUCT takes our first high-efficiency nozzle, the KONGSBERG TK, to the next level.

The TK Nozzle originally gave significantly more bollard pull than its predecessor, the 19 A model, and performed substantially better at higher speeds. The PRO-DUCT takes these improvements a step further, giving even more bollard pull than the TK Nozzle.

TECHNICAL DATA

US Thruster type	Max Power (kW)	Bollard Pull [mtons] with 2 x AZM, max Power
US165 PD2400	1340	52
US205 PD2400	2000	67
US205 PD2500	2000	69
US205 PD2800	2000	74
US255 PD2600	2400	80
US255 PD2800	2525	87
US255 PD3000	2560	93