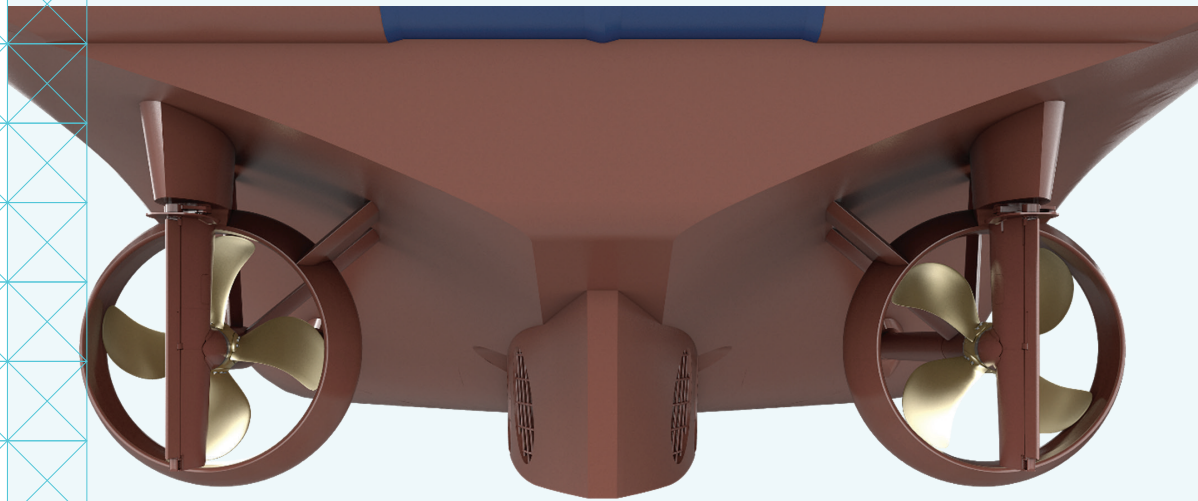




KONGSBERG

PROMAS WITH NOZZLE



PROMAS PROPULSION AND MANOEUVRING SYSTEM

PROMAS with nozzle

SUPERIOR ENERGY EFFICIENCY, FUEL-SAVING AND BOLLARD PULL CAPABILITIES

A highly efficient propeller and manoeuvring system

Building on the successful PROMAS, this system unites a nozzle with an optimised propeller, hubcap, rudder bulb, and a twisted leading edge rudder profile developed to provide increased bollard pull and better propulsive efficiency. It meets the highest requirements for bollard pull at low speed with a high efficiency at free running speed in transit. The components are designed to work together in a ducted system. The profile of the nozzle design for PROMAS has been developed through CFD analysis and experimental testing at Kongsberg Hydrodynamic Research Centre (KHRC). It represents a significant improvement compared to standard nozzle profiles, normally used. Water flow leaving the nozzle interior passes over a rudder of a particular profile developed to provide very high steering side forces yet minimum drag.

The nozzle design



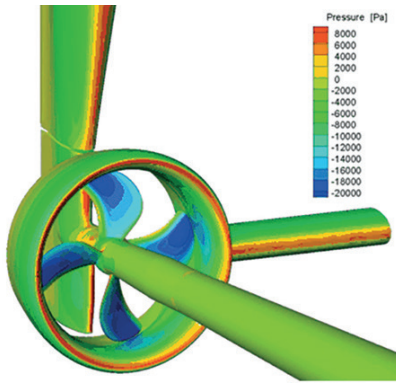
The nozzle profile in a free-running situation. The profile controls water flow to provide a low drag solution.



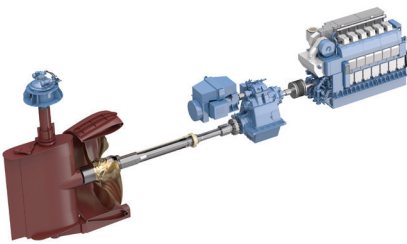
The nozzle profile in towing condition. The shape gives vortex-free flow into and around the nozzle, boosting thrust and improving bollard pull.

ADVANTAGES

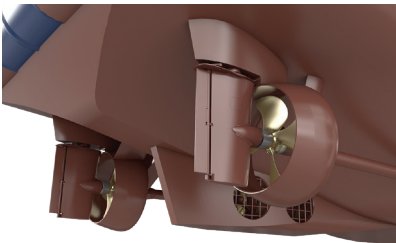
- Reduced fuel consumption
- Increased bollard pull
- Short payback period
- Environmentally friendly solution
- Customised to the operational profile
- Robust design
- Designed to simplify the installation procedure
- Available extensive reference lists
- 24/7 global service and support



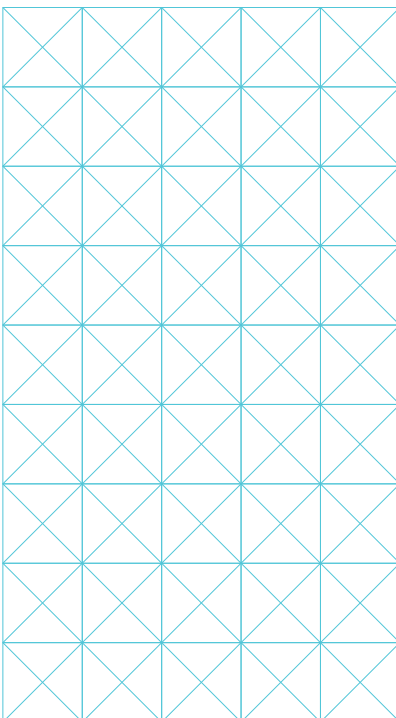
We predict the performance with the latest technology



Robust and customised solution



Through experience, we enable for a faster installation



A typical anchor handler propulsion system will reduce fuel consumption in transit by 15-20% and improve bollard pull by around 5-8%. PROMAS with nozzle also shows remarkable improvements of efficiency for dry cargo and bunker vessels with lower speed or ice-class. The rudder may be either a one-piece design or a medium flap-type, depending on the exact requirements of the operating profile. The bulb optimises the hydrodynamic properties by reducing the creation of vortices and hub drag. This makes the system more efficient in propulsion thrust and consumes less fuel. To fit the operational vessel profile, the propeller can be manufactured and custom-designed with four or five blades. It is also possible to shorten the length of the hub cap at the shipyard to make the installation easier.

Why Kongsberg Maritime as a supplier?

Kongsberg Maritime have the only fully equipped hydrodynamic research centre in the business. We aim to develop solutions to make our clients' businesses profitable and secure their different expectations of the propulsion systems. We use the latest CFD methods, model tests, and in-service results to improve, customise and design optimised solutions for our clients. Through our advanced testing technology and in-service results, we can ensure the performance of our propulsion systems. In addition, we can provide extensive reference lists of earlier successful deliveries and installations. Kongsberg Maritime offers high performance and a new quality standard for our solutions with a global service network to support you through life.

Kongsberg Maritime's research centre and personnel ambitiously focus on developments for our customers. We have noticed growing expectations in energy efficiency, quality, higher bollard pull, and environmentally friendlier solutions. Shipowners, operators and shipyards are always interested in reducing fuel consumption, operating costs and installation time. PROMAS with nozzle is the latest development of propulsion systems to meet various market challenges. PROMAS with nozzle is customised for the individual ship and the vessel's operating profile to meet different challenges.