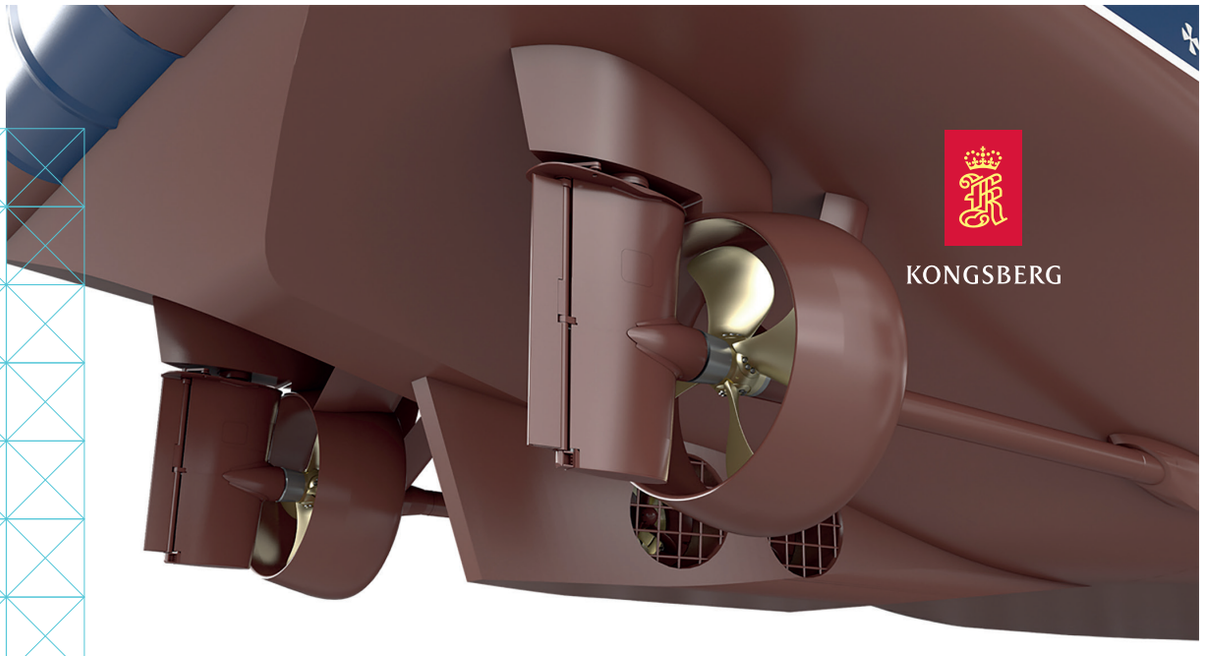
PROMAS WITH NOZZLE



KONGSBERG

KONGSBERG MARITIME PROPULSION SYSTEMS

Promas with nozzle

High efficiency propulsion system offering improved fuel efficiency and increased bollard pull for offshore vessels

Building on the success with Promas, Kongsberg Maritime has further developed the system to suit applications where there is a requirement for a high bollard pull, such as anchorhandling offshore vessels (AHTS) and tugs. The operational profile of many offshore vessels is quite different from merchant ships, requiring both a large pulling power at low speed and high free-running speed in transit.

The Promas with nozzle system is designed for these varying operating modes. In the case of anchorhandlers offering an increase in propulsion efficiency in both modes. The complete AHTS installation comprising Promas with nozzles and optimised propellers and rudders can reduce fuel consumption in transit by 15-20%, with a consequent cut in emissions, and improve the bollard pull by typically 5-8%.

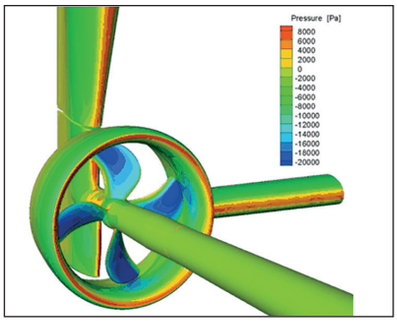
This system unites a new type of nozzle with an optimised propeller, hubcap, rudder bulb and a special rudder profile. Components are designed to work together to provide a ducted system maximising efficiency and minimising disturbances to the water flow both through and around the nozzle.

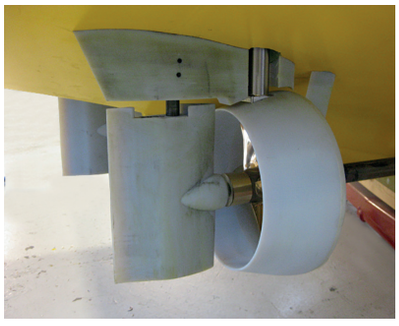
The profile of the new nozzle design for Promas has been developed through CFD analysis and testing, and represents a major advance on the 19A profile which is widely used for conventional nozzle propeller installations.

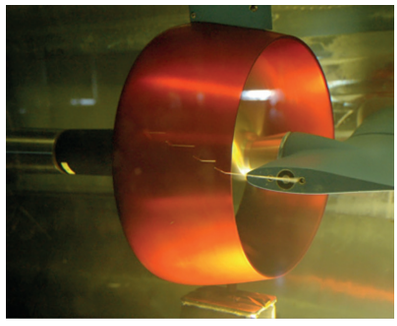
Water flow leaving the nozzle interior passes over a rudder of special profile developed to provide very high steering side forces yet minimum drag. Depending on the exact requirements the rudder may be either a one piece design or a medium flap type.

Testing and verification

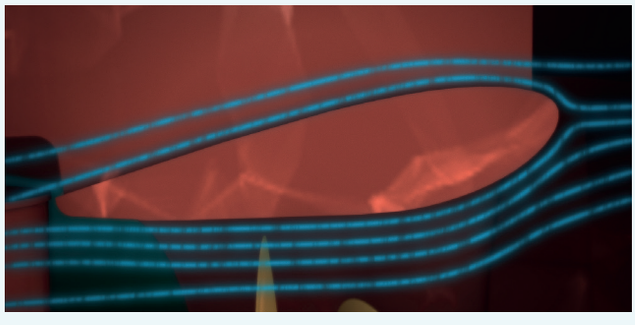
Following CFD calculations, the Promas with nozzle system results were confirmed by tests with the hull in place using large scale models in the test tank (centre) and by other testing in the Kongsberg Maritime cavitation tank in Sweden (right).



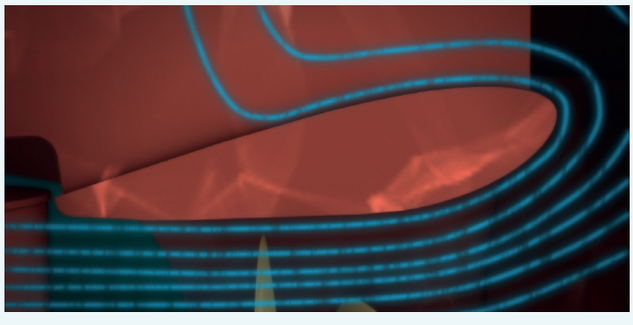




New nozzle design



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



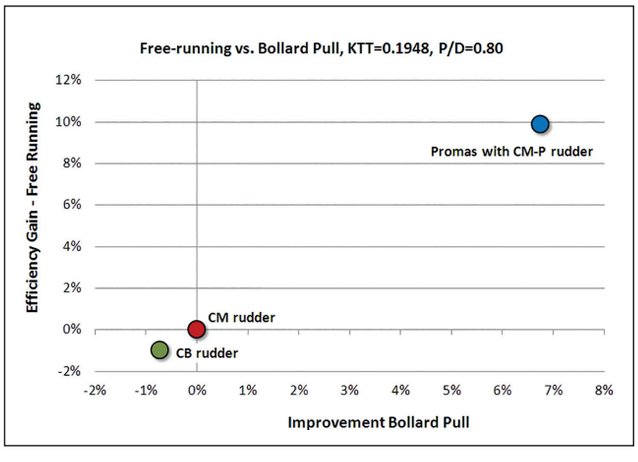
New nozzle profile in towing condition. The shape gives vortex-free flow into and around the nozzle, boosting thrust and thus improving bollard pull.

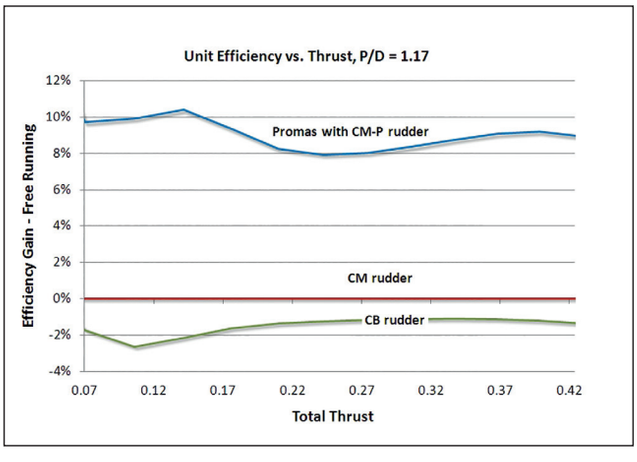
Reduced fuel consumption and improved bollard pull

Promas with nozzle has been developed using CFD (computational fluid dynamics) techniques verified by testing in the cavitation tank at the Kongsberg Maritime Hydrodynamic Research Centre and with large scale models.

The two graphs show the improvements in both bollard pull and free-running efficiency for Promas with the new nozzle. The lower lines are referenced to a standard rudder profile and the upper line shows the results achieved by adding on the Promas system. The new nozzle design was used in both the bollard pull and free-running tests.

- CM rudder - medium rudder with new nozzle design
- CB rudder - bulbous rudder with new nozzle design
- Promas - Promas rudder with hubcap, bulb and new nozzle design





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