



New Alpha CP Propellers

A high-efficient VBS Mk 5 design is revealed at SMM

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MAN Diesel & Turbo presents a new high-efficient VBS propeller generation on their stand in Hamburg. A VBS Mk 5 version of the Alpha Controllable Pitch Propellers, which has been developed on the basis of the industry's state-of-the-art design tools combined with the company's vast experience accumulated from more than 7,000 propellers.

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The new programme is designed to propel a wide range of different ship types with CP Propellers – customised to match their individual operational requirements, power modes and optimising points. The new VBS Mk 5 generation consists of a complete range – a total of 20 new hub sizes, which are handling outputs from 1,000 and up to 40,000 kW. The new range spans from hub diameters of 600 mm and up to 2,150 mm – distributed on three series designs: S (small, 600-940 mm), M (medium, 1,020-1,550 mm) and L (large, 1,640-2,150 mm).

Efficiency increase

The major benefit of the VBS Mk 5 propeller is an increased efficiency of up to 2%. The operational advantages of increased propeller efficiency are translated into savings via lower fuel consumption and reduced exhaust gas emissions. The increased efficiency may alternatively be exploited as higher thrust for increased ship speed or higher bollard pull for a given engine power.

Hydrodynamic refinements

The shape of the new hub is flow-optimised at its afterpart and reduced in size – resulting in a lower hub/propeller diameter ratio and a reduced drag. The flow optimisation includes a new and more streamlined shape of the hub and blade foot integration, resulting in a blade foot, which is completely flush with the hub contour.

A design for demanding applications

The optimised hub/blade interface allows for higher propulsion power densities. Higher cavitation inception speed is allowed for the propelling of high-speed vessels. A reduced risk of root cavitation permits higher blade loading for demanding propulsion applications.



Compact, robust and lightweight

The new hub design is simplified with approx. 40% fewer parts. The traditional Alpha propeller reliability and durability has always been very high, and the Mk 5 design extends that design philosophy. The material fatigue levels are calculated for a 30 year lifetime, considering all possible external loadings in service. Furthermore, the overall weight has been reduced for less impact on e.g. strut and stern tube bearing loads.

Increased service friendliness

Unique benefits for the shipowners and operators are presented with the new VBS Mk 5 design. The new propellers have been developed with a number of inherent service, inspection and exchange features – including the unique possibility of inspecting/repairing all of the hub interior parts with the propellers placed in situ:

- The propeller blades can be exchanged inside a propeller nozzle – without pulling the shaft
- The hub is completely serviceable with the propeller installed in the ship. No need for shaft/coupling flange dismantling, shaft pulling and removal of the rudder
- Possibility of check/inspection and replacement of internal parts without removing the propeller blades
- Hub bearing surfaces are exchangeable
- The hub and shaft flange connection is designed for easy inspection during docking and survey
- Maintenance concepts for hub wearing parts are available
- Underwater exchange of propeller blades is possible



Oil distribution unit for pitch control

A new compact ODF oil distribution unit – for gearbox mounting – has been developed for the VBS Mk 5 propellers. A short and very robust unit with 20% fewer parts compared with today's ordinary ODF designs. The installation length has been reduced by 15% – for the benefit of very short and compact engine-gear-propeller installations – still with necessary access and service friendliness.

Green propelling

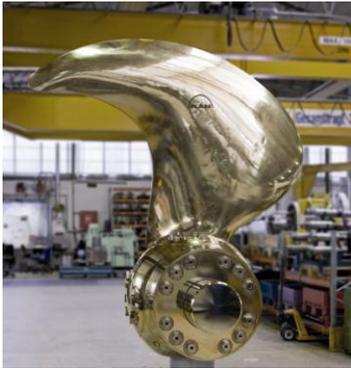
The flexibility of covering efficiently any propulsion power requirement and CP Propeller application is the overall product target for MAN Diesel & Turbo. Propeller and propulsion efficiency also carries the 'green aspect', as every gram of fuel saved by means of higher propulsive efficiency, results in a reduced impact on the environment. Additionally, the new propellers have a green light for environmentally friendly lubes, as they are prepared for biodegradable servo and lube oils. The servo oil and lube oil systems are adapted to both biodegradable oils and ordinary mineral oils, and switching from one type to the other is possible without any requirements for component changes.

Tradition and continuous development

A long MAN Diesel & Turbo tradition and a proud propeller heritage date back to the first Alpha CPP design, which was produced in 1902 and patented in 1903. Naturally, extensive development has taken place since then. There are, however, still new marginals to conquer and efficiencies to gain with modern propeller and aftship design, and to maintain and develop MAN Diesel & Turbo's position in the propulsion forefront, many resources have been invested and the latest advanced design tools, including e.g. CFD (Computational Fluid Dynamics), FEM (Finite Element Methods) and Topology Optimisation, have been deployed. To verify the calculations, MAN Diesel & Turbo cooperates with the world's leading test tanks and research institutes.



Illustrations and captions:

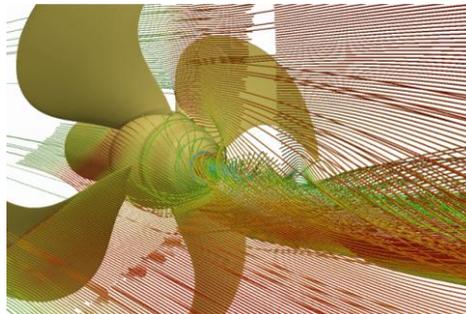


The VBS Mk 5 propeller: 20 hub sizes will range from 600 mm and up to 2,150 mm, corresponding to an approx. power range of 1,000-40,000 kW.

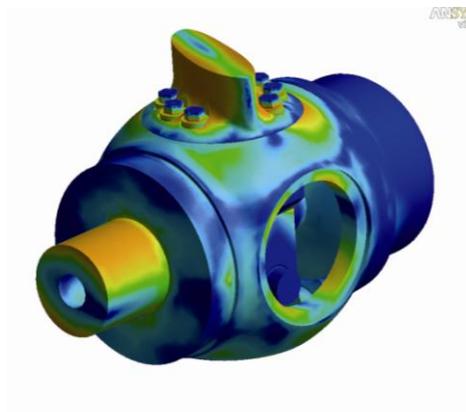


The optimisation of the VBS Mk 5 includes a new and more streamlined shape of the hub and blade foot integration. The blade foot is completely flush with the hub contour.

Hydrodynamic optimisation of VBS Mk 5: CFD streamlines during operation, showing reduced hub vortex. The shape of the new hub is flow-optimised at its afterpart and reduced in size – resulting in a lower hub/blade diameter ratio and a reduced drag.



A VBS Mk 5 stress distribution calculation under maximum ice load, using advanced contact and material models. The hub and internal parts have been designed for ice operation according to the newest IACS ice class rules. MAN Diesel & Turbo is first with the implementation of the 2010 rules into the actual design.



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About MAN Diesel & Turbo

MAN Diesel & Turbo SE, based in Augsburg, Germany, is the world's leading provider of large-bore diesel engines and turbomachinery for marine and stationary applications. It designs two-stroke and four-stroke engines that are manufactured both by the company and by its licensees. The engines have power outputs ranging from 450 kW to 87 MW. MAN Diesel & Turbo also designs and manufactures gas turbines of up to 50 MW, steam turbines of up to 150 MW and compressors with volume flows of up to 1.5 million m³/h and pressures of up to 1,000 bar. The product range is rounded off by turbochargers, CP propellers, gas engines and chemical reactors. MAN Diesel & Turbo's range of goods includes complete marine propulsion systems, turbomachinery units for the oil & gas as well as the process industries and turnkey power plants. Customers receive worldwide after-sales services marketed under the MAN PrimeServ brand. The company employs around 12,700 staff at more than 100 international sites, primarily in Germany, Denmark, France, Switzerland, the Czech Republic, Italy, India and China. MAN Diesel & Turbo is a company of the Power Engineering business area of MAN SE, which is listed on the DAX share index of the 30 leading companies in Germany.

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