Propeller development

**MAN Diesel & Turbo is now Owner of Kappel Propeller Designs**

New fuel-saving and energy-efficient propulsion opportunities are available from the MAN Alpha propeller programme, which now fully integrates the Kappel tip fin propeller blade designs for both controllable pitch propellers and fixed pitch propellers.

On 20 March 2012 the board of MAN Diesel & Turbo approved the company’s take-over of Kappel propeller - including designs, software, and intellectual property together with continued co-operation with Mr Jens Julius Kappel.

The original contract was signed on 29 February in Copenhagen, Denmark – by JJ Kappel and Torben Johansen on behalf of MAN Diesel & Turbo. JJ Kappel said after the contract signing: “We have had a good co-operation with MAN Diesel & Turbo for almost 10 years, and our joint projects have gone well. I hope that MAN will get the most out of the Kappel technology. Our co-operation does not end here – it will in fact become more intense”.

**Past co-operation**

The co-operation between Kappel and MAN Diesel & Turbo officially started already in 2003 – on 3 December to be more specific, when 100 years of MAN Alpha CP Propeller production was celebrated in Frederikshavn. Shortly after that on 3 March 2004, MAN Diesel & Turbo was awarded the contract of supplying new-designed high-efficient Kappel CP Propeller blades as part of Scandlines’ extensive refurbishment of the ferries M/F PRINS JOACHIM and M/F KRONPRINS FREDERIK. This was later followed by a successful Kappel upgrading of additional four Scandlines vessels - thus proving the soundness of the concept.

**Fuel savings and EEDI**

In today’s market green technology, fuel-savings, energy optimisation and increased propulsion efficiency are more important than ever – for both new ship designs and for existing ships’ retrofit and upgrade solutions. The energy-saving technology, which MAN Diesel & Turbo now owns - will be matured and implemented in a greater variety
of customer solutions including e.g. hydrodynamic integration of rudder bulbs, high-efficiency rudders, hull’s flow-guiding devices and ducts.

Compared to conventional designs, the Kappel propeller blade designs offer fuel savings by up to 6%. And it has to be noted that this improvement with the Kappel design is related to the blade design alone, thus not relying on improvements with other components – such as e.g. a rudder bulb integrated with propeller and rudder.

Optimised propeller and propulsion efficiencies contribute to lowering the EEDI (Energy Efficiency Design Index) of ships, as every gram of fuel saved by means of higher propulsive efficiency results in more energy-efficient transport – like in this case with up to 6%.

Both new sales and the retrofit after sales business will benefit from the now MAN owned technology. In retrofit installations, especially in situations where ships undergo a changed operational profile with slow-steaming and de-rating of main engines, MAN Diesel & Turbo will be able to deliver superior propulsion solutions including state-of-the-art propeller designs offering even larger fuel savings.

**Low pressure impulse-to-hull and G-type advantages**

Compared to a conventional design the Kappel propellers have shown lower pressure impulses which can be utilised for bigger and more efficient propellers because of the reduced clearance between hull and propeller tip. Combined with the G-type MAN B&W engine, further improvement in propulsion efficiency can be exploited. The new ultra-long stroke low-speed G-type has a longer stroke and lower engine speed with increased engine efficiency – and deploys a larger and more efficient propeller for tomorrow’s energy-optimised aft ship designs. In that combination fuel consumption and CO₂ emission are reduced by up to 10%.
**Caption 1:** Torben Johansen, Head of Propeller & Aft Ship Unit, MAN Diesel & Turbo shaking hands with Jens Julius Kappel (right) after signing the contract for the Kappel design business concerning propellers and all affiliated intellectual property rights including software, on 29 February in Copenhagen, Denmark.

**Caption 2:** MAN Alpha propellers (FPP scale 1:28 models shown) with four-bladed conventional blade design (left) and five-bladed with Kappel tip fin design (right). As with the CPP range, the MAN Alpha FPPs are also covering a power range of 4-40 MW, corresponding to e.g. MAN B&W low-speed engines up to the G80ME-C9 series.

**Caption 3:** MAN Alpha Kappel tip fin design features and benefits: Tip vortices are formed due to the difference in pressure between the pressure and suction side of the propeller as the water will move from the region of high pressure to the region of low pressure. The pressure on both sides near the tip will therefore equalise and the efficiency of the tip region will decrease. The Kappel design minimises the flow over the tip, and the outer region of the Kappel propeller therefore retains a high efficiency increasing the total efficiency of the Kappel propeller compared to conventional designs.
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 14,000 staff at more than 100 international sites, primarily in Germany, Denmark, France, Switzerland, the Czech Republic, 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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