# EU R&D project for the Kappel propeller



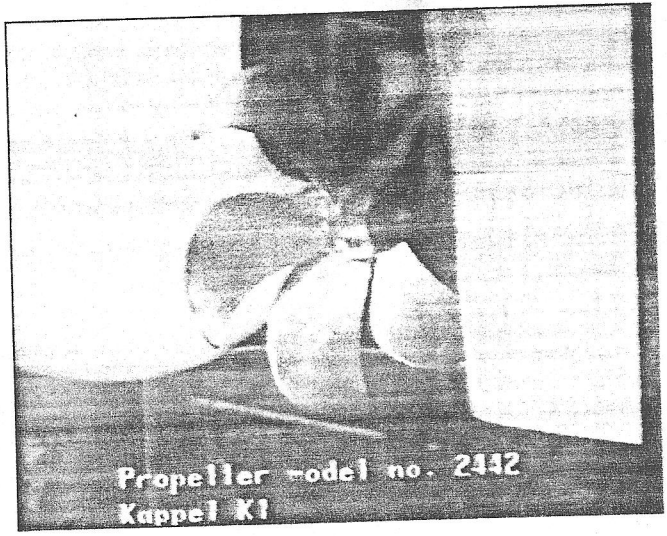
A JOINT European Union-funded project under the name Kapriccio was set up last August for further development of the Kappel propeller, which has been conceived by J J Kappel Marine Concept, of Denmark (*The Naval Architect* July/August 1994, page E354). It will run for three years and will also involve Kvaerner Warnow Werft, Stone Manganese Marine Ltd, the German research and test tank HVSA, the Danish Maritime Institute (DMI), and The Technical University of Denmark. The Kappel propeller is said to offer an increase in propulsive efficiency for similar or lower vibration excitation when compared with conventional designs, through the use of unconventional tip geometry based on non-planar aerodynamic theory.

The Technical University of Denmark is developing further the theory of non-planar lifting surfaces, including behaviour in a stationary wake field, while the DMI is developing a numerical method to determine pressure pulse levels induced by the propeller working in the wake field. The scale effect of a Kappel propeller is larger than for conventional propellers, and HVSA, together with The Technical University of Denmark, has therefore developed consistent methods - compatible with methods generally used by this German test tank- to estimate the scale effects. These methods have been tested experimentally by varying the Reynolds number. Work will include a full-scale test which will enable correlation between theory, model experiments and full-scale test results.

All propellers in parametric investigations (and a conventional propeller for comparison) to be carried out under the Kapriccio programme will be six-bladed and designed for a CV2900 container ship type already being built at Kvaerner Warnow Werft.

Step-wide modifications in geometry and parametric calculations for the Kappel propeller are being made by J J Kappel, while those for the conventional design will be made by Stone Manganese Marine. The latter company is additionally to investigate stress in a Kappel design, using a specially developed FEA coding, and will also carry out a research programme into casting and finishing of the novel blade shape involved. In association with the other partners, Stone Manganese Marine will also investigate methods of accurately defining and measuring Kappel blade geometry.

The HSVA test tank will carry out open-water, self-propulsion and cavitation tests, also tests at various Reynolds numbers to verify scale effects. Cavitation experiments will be made in the HSVA's Hykat tunnel where propellers will be tested behind an actual CV2900 hull. Following all this work, the final shape will be designed, tested and compared in both model and full scale with a state-of-the-art conventional propeller.




**A model Kappel propeller being tested in the Hykat cavitation tunnel at HSVA, Hamburg, behind the hull of a Kvaerner Warnow CV2900 container-ship hull.**