TWIN SCREW PROPULSION: Some Aspects of Propulsion Efficiency, Manoeuvrability in relation to Redundancy.

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Synopsis

The presentation considered aspects of twin screw ships in relation to their single screw counterparts in terms of manoeuvrability, propulsion efficiency and redundancy. All of these issues have an implication for operating cost and the discussion ranged across a number of ship types including bulk carriers, container ships, LNG ships, passenger ships and tankers.

From statistics based around the cause of loss it was seen that while weather, grounding and fire were the principal causes of total loss claims, machinery was by far the greatest cause of partial loss. Discussion then turned to the redundancy requirements for passenger ships that will come into force on the 1st July 2010 and the implications these will have on design in terms of the systems which will need to be kept operational in the event that a space becomes non-operational.

Attention then turned to the propulsion efficiency of twin screw ships in relation to conventional views and these were challenged in the context of modern hull forms and propulsors, particularly in relation to very large container ships, in excess of 15000 teu, and LNG ships. Within this discussion the importance of and problems associated with scale effects featured. Following on from this, the implications of these effects were then considered in the context of propeller cavitation development and bearing forces and moments as was the interaction between hull surface pressure magnitudes and propeller efficiency.

Within the context of ship manoeuvrability the advantages of podded propulsors over conventional systems were examined as was the importance of taking a considered view of the interpretation of the SOLAS requirements in relation to podded propulsor manoeuvring. Discussion then moved on to the importance of load prediction, material quality, oil quality and control philosophies in relation to achieving acceptable reliability of podded propulsors. Finally, some discussion was held on the methods by which the cavitation performance of rudders could be predicted and the correlation that was achievable by two phase modelling with modern computational fluid dynamics (CFD) codes.

After obtaining his doctor's degree John Carlton started his professional career in the Royal Naval Scientific Service undertaking research into underwater vehicle hydrodynamic design and propulsors. Five years later he joined Stone Manganese Marine Ltrd at Greenwich as a propeller designer and research engineer. In 1975 he joined Lloyd's Register, first in the Technical Investigation Department and after nine years transferred to the Advanced Engineering Department as its Deputy Head. In 1992 he returned to the Technical Investigation Department as Senior Principal Surveyor and Head of Department where he served for 11 years and then in 2003 he became the Global Head of Marine Technology and Investigation for Lloyd's Register.