Optimising redundancy

The six new 8,000 dwt product/chemical tankers currently building in Romania's Damen Galati shipyard for German owners to the so-called Safety Chemical Oil Tanker (SCOT 8000 design), and profiled in the Technical pages of this issue, are provided with not only redundant propulsion systems but also hull forms which have been optimised to increase propulsive efficiency.

The design highlights the growing concern about tanker safety amongst charterers of tonnage serving the European trades in the wake of the Erika and Prestige sinkings. In their current round of ordering new ships many shipowners are opting for designs which incorporate at least some element of propulsion system redundancy.

Germanischer Lloyd, the SCOT 8000 ships' classification society, has notations for three levels of technical redundancy. RP 1 ships are those with redundant propulsion systems; RP 2 ships have redundant steering gear; while RP 3 ships have both redundant propulsion and steering gear systems.

For RP 3 ships, each redundant system must be separated mechanically and electrically and be installed in separate compartments so that they are independent of each other. An additional index indicates the percentage of the main propulsion system's power output which is provided by the redundant system.

Ships with RP 1 and 3 notations must be able to sail, under the redundant system, at a speed of at least 7 knots in Beaufort 5 headwinds in significant wave heights up to 2.8 metres. At Beaufort 8, with significant wave heights of 5.4 metres, the ship must be able to manoeuvre into a position of less resistance against the weather and maintain this position.

The SCOT 8000 ships have the notation RP 3 50%. The ship was designed by the Lindenau shipyard in Kiel, Germany, while the Hamburg Ship Model Basin (HSVA) was instrumental in optimising the ship's hull lines. To meet the demands of the RP 3 50% notation, the SCOT 8000 tanker is configured with twin skegs to accommodate the full afterbody and the two engines positioned relatively far aft in independent engine rooms.

Generally, twin-skeg ships have a higher resistance than conventional hulls due to the larger wetted surface area. However, this can be compensated for in good designs by increasing propulsive efficiency.

Hydrodynamic analysis and model tests confirmed that the hull shape developed for SCOT 8000 had the lowest power consumption of the many similar-sized single and twin-screw ships on the HSVA database. "Furthermore, good water flow between the skegs and a relatively homogeneous wake field have resulted in an extraordinarily quiet vessel," states Karl-Heinz Rupp at HVSA.

The manoeuvring performance of SCOT 8000 also proved to be good, with the design exceeding the IMO recommendations regarding yaw checking and course-keeping ability.