Technical Feasibility of the 100 Knot Yacht

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Abstract

Donald L. Blount and Associates, Inc. has design cognizance over four of the world’s fastest fifteen megayachts. Included in the list of the fastest yachts are the gas turbine Motor Yacht DESTRIERO and the gas turbine Motor Yacht FORTUNA. GTMY DESTRIERO, length overall of 67.7m (222 feet), holds the record for the fastest Eastbound trans-Atlantic crossing at 53.09 knots. GTMY FORTUNA, length overall of 41.5m (136 feet), has been featured in The Superyachts, Volume 14 and achieved a 68 knot top speed during trials. Through these and a number of other projects, the state-of-the-art for gas turbine / waterjet propelled large yachts has been defined.

This paper explores the feasibility of a 100 knot yacht. The analysis is based on data available within the public domain and examines the relationship between weight, power and speed for a variety of hull forms. Assuming a desired speed of 100 knots, the relationship between size and power required is determined from state-of-the-art curves. Various displacements, representing yachts of different sizes, are assumed and the power required to drive each size yacht is determined. From a length-displacement regression, the length of each yacht is determined. The selection of a hard-chine planing mono-hull is explained.

In addition to the 100 knot requirement, the vessel has the requirement to be a true yacht with creature comforts and accouterments befitting a yacht. Key to the performance of the vessel is its ability to handle seas. Recommendations for maximum sea state operation are provided. The number of propulsors are determined and the philosophy behind the selection of the gas turbine / waterjet drive train is discussed. Recommendations for power plant sizing are provided and initial range estimates are determined. Finally, some of the technical difficulties to be overcome are addressed.

References