ABSTRACT

Flat-type river-sea-going multi-purpose ship with large block coefficient is designed to satisfy the requirement of shipping market. The key technologies of safety, energy saving and green ship for flat-type and shallow draft ship are solved in the present research. Through the economic analysis, seaworthy analysis, structural safety analysis and considering the natural environmental condition of navigating route, the river-sea-going multi-purpose ship is developed which have larger capacity, lighter structural weight, lower fuel consumption and excellent performance.

KEY WORDS: Flat-type ship with large block coefficient; river-sea-going multi-purpose ship; mold line optimization; structural safety; energy-saving device

INTRODUCTION

Yangtze River, also called golden waterway, is a strategy thoroughfare connecting eastern coastal international trade, growing up of central region and western development strategy of China. It supports logistics, comprehensive transport system and economic and social development of seven provinces and two cities in the valley of Yangtze River (Changjiang River Administration of Affairs, 2014). Chinese government plans to make all valleys as a new economic supporting district relying on the golden waterway. Recently, with the rapid economic development and the construction of new coastal port, river-sea-going multi-purpose ship with large capacity is strongly demanded by shipping market. Shipping route shall be from Ningbo Beilun Port to Wuhan industrial port transporting iron ore, coal, cement, clinker, and so on, and from Wuhan new port shipping containers to Shanghai Yangshan Port. River-sea-going ship directly transports cargoes between sea and river, reducing the cargo transfer process, exempting the intermediate port berth, shortening the voyage time so that the shipping costs can be decreased. It has a competitive advantage owing to its economic and social benefits. Due to the present status of channel of Yangtze River and the limitation of bridge clearance height, the depth and draught of such ship is usually smaller, and the width is designed wider in order to increase the capacity. There is long and wide hatch opening for containers and/or improving the loading/unloading efficiency of bulk cargoes. There is also requirement on sea-keeping performance and flexible maneuverability in order to better adapt to sea part of navigating route. So, there is challenge on design such flat-type river-sea-going multi-purpose ship.

During the course of design such ship, mold line optimization based on hydrodynamic calculation and testing, application of energy saving technology, seaworthy technology on shallow draft ship with large block coefficient as well as structural lightening design, are considered. It had solved the deficiencies of existing river-sea-going ship as follows.

1) Cargo shedding in dry season,
2) Empty-way for ore carrier,
3) Stall in the sea,
4) Stem slamming,
5) Excessive structural weight,
6) Maladjustment for present infrastructural status of channel and port,
7) Lack of energy saving devices.

KEY TECHNOLOGIES

Due to the status of channel of Yangtze River, the designed river-sea-going multi-purpose ship has characteristics of flat, shallow draft and large block coefficient in order to satisfy the requirement of larger capacity. It is quite difficult to design such ship in normal way. In the present research, the theory analysis, numerical calculation and model test are combined together to solve the safety technology, energy saving technology and green ship technology for flat-type and shallow draft ship in order to reach the objective of safety, lower fuel consumption and less emission. Through the economic analysis, seaworthy analysis, structural safety analysis and considering the natural environmental condition of navigating route, the river-sea-going multi-purpose ship is designed which has larger capacity, lighter structural weight, lower fuel consumption and excellent performance.

Low Resistance Mold Line Design

The navigation route of river-sea-going ship includes both Inland River

Design on Flat-type River-Sea-Going Multi-Purpose Ship

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