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A SHIP BLOCK LOGISTICS SUPPORT SYSTEM BASED ON THE SHIPYARD SIMULATION FRAMEWORK

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ABSTRACT

The block logistics in shipyard accounts for a considerable proportion of the production cost. And further, it used to effects serious delays on the shipbuilding processes in typical cases. However, the planner hardly incorporate the logistics into serious consideration due to its various restriction at the stage of production planning. In this paper, a simulation-based ship block logistics support system is suggested. With which, the block logistics is to be simulated according to the various production plans and operational strategies of shipyards. The suggested system will allow planners and the management to determine the current state of logistics and to have the insight of improvement as well, reflecting effectively the constantly revised production plan of the shipyard. In addition, the system can be easily adapted to the any shipyard, since it has been developed based on a shipyard simulation framework which can be extended properly with its scalable components.

1 INTRODUCTION

Large ships are generally built using the hull block construction method that divides the ship into several blocks (Kim et al., 2005). As many projects are built simultaneously in a shipyard, the ship blocks and various assemblies constituting the blocks need to be transported almost at the same time in the shipyard. An accurate an efficient planning of the logistics among the various areas of the shipyard—workshop, stock area, and dock—is a challenging task. And the wrong and inefficient planning of the logistics may cause a serious delays in the shipbuilding process, as well as an increase in the production cost. To mitigate such adverse effects, the logistics need to be considered from the early stage of the production plan. During the production planning stage, however, it is said to be difficult to incorporate the logistics into consideration, and even if it is incorporated, the planner hardly reflect the current status of the production site. Moreover, the planner or the management usually only have poor assessment measures and methods for the evaluation of the cost of the block logistics.

Recent studies on the block logistics monitoring and simulation system were performed to reduce its unnecessary cost. However, due to some practical problems and technological limitations, the system used to has been utilized ineffectively. In a shipyard, particularly, production plans are updated periodically and frequently, and various strategies of production are to be considered. In order to calculate the logistics cost

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efficiently under the frequent updates and various strategies, a quick and easy-built circumstance for simulation system is essential and robust systematic methods of analyzing need to be established.

In this paper, a ship block logistics support system based on the shipyard simulation framework is suggested. The proposed system conducts the block logistics simulation according to the various strategies of production and provides the analyzed results. The system can also be used to calculate the logistics cost accordingly. This paper deals with the components, functions, and roles of the simulation-based block logistics support system and the shipyard simulation framework.

2 SIMULATION-BASED SHIP BLOCK LOGISTICS SUPPORT SYSTEM

The ship block logistics support system proposed in this paper is based on the shipyard simulation framework. The shipyard simulation framework involves a method and its components for performing shipyard simulation in a systematic manner (Jeong et al., 2016). This framework consists of an information model, simulation platform, and simulation target. The simulation target is represented by KPI (key performance indicators). The framework supports the establishment of the simulation target and also builds the components of the simulation platform and the information model for the simulation target quickly and accordingly.

The simulation-based ship block logistics support system utilize the production planning data and shipyard geographic data as input. A data adapter converts these data into compatible format to the simulation model. The simulation model is expressed using the process-centric simulation modeling method (Song, 2013). The system consists of an block arrangement module, a route search module, and a DES (discrete event system) simulation engine for the simulations. An optimizer is also applied to the block arrangement module and the route search module.

3 CONCLUSIONS

This research suggests a simulation-based ship block logistics support system for improving the block logistics in shipyard. The proposed system is based on the shipyard simulation framework for building the block logistics simulation quickly, efficiently and systematically. And the system utilizes production planning data to determine the projection of the ship block logistics. In addition, the quantitative simulation results are to be duly analyzed and referenced in many important decision making processes.

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