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A Study on the Engineering Support System for Offshore Outfitting Design

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Abstract. In this paper, we have designed a standardized framework for offshore outfitting design, which enables users to properly recompose the menu form depending on the task process, simplifies the methods at several process levels and provides a more intuitive method in user interface environment in order to resolve the existing problems, minimize the system-operating costs, and improve the efficiency of the offshore outfitting engineering tasks.

Keywords: Engineering Support System, Shipbuilding, Offshore Outfitting Design, Knowledge Base, Framework

1 Introduction

Recently, large shipbuilding companies are taking part in a competition to acceptance of an order of offshore project. Furthermore, some governments are showing support to win this competition. Especially, Korean government is accelerating consolidation of competitive power to conduct IT convergence in the offshore plant. But, they face a lot of difficulties in the work environment of designing and producing offshore plant due to owners' various and particular demands, besides each ship building company is hampered by lack of production and design engineering capacity. Currently, many shipyards continue their effort to foster offshore design engineers. Offshore plant needs more high leveled outfitting design capability. The engineering support system was developed to fill the need for a high quality design of offshore plant what customer wants. In this paper, we have designed a standardized framework for the support system of offshore plant engineering that can effectively resolve the existing problems and minimize the engineering and production costs by making the utmost use of the existing system and improve the efficiency of outfitting engineering tasks.

2 Related WORKS

Oil Major send an order to shipbuilding company as EPC(Engineering, Procurement, Construction). After the contract, the shipbuilding company reviews owner's requirements and FEED design and draw detailed design to produce. These processes are differed with each

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shipbuilder. Especially, the range of engineering is depends on their engineering capability. Generally, shipbuilding companies put engineering and design of topside the offshore plant tasks out to specialized engineering company with a mint of money[6]. Each shipbuilding company makes a greater effort to hold capabilities of FEED engineering of topside process for oil and gas production, but still not entirely satisfactory. Because of that, this paper treats after FEED design process. The offshore design is consisted of AFD (Approved for Design) process, IFA(Issue for Approval) process, AFC(Approved for Construction) process and Production Engineering process. The AFD and IFA processes are concept design. Those generally do specialized engineering company. The shipbuilding company does AFC and Production Engineering processes. The next design processes are took basic design for the plant construction, detailed design and production design in order.

In the offshore plant production, the design engineering tasks are very important position during its lifecycle. During design engineering, designers should do many activities and handle various information, knowledge, design data and software tools for engineering. As the years go by, to survive head-to-head competition, big shipbuilding companies obtain difficult offshore projects more and more. Generally, the owners and classes request high requirements for offshore project more than commercial shipbuilding. Due to the high requirements, the shipyards lose business efficiency. As a result, the design engineers are buried in all the work they have to do and the information are overflow during design process. To overcome these problems, a number of information management systems were developed sporadically. But these systems bring it more inefficiently. Thus, the centralized engineering information support system is need. It can serve centralized standard data and various engineering software tools to design engineers effectively. In the pursuit of these purposes, the design of engineering support system is required understanding of the characteristic of offshore design tasks and its processes.

3 Design of Framework for Support Systems of Offshore Outfitting Design Engineering

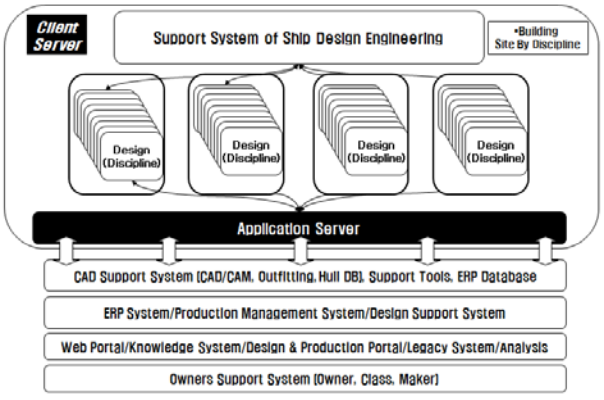

Fig. 1. Structure of Framework

When it comes to the tasks of the offshore outfitting design engineering, all users of the engineering system should be able to use identical data by accumulating and integrating various information. We propose a knowledge-based framework in which information and knowledge obtained from users' learning and know-how can be re-created. In this paper, the framework

proposed by us consists of client server, application server and support system. The client server provides support to build site of each design part. The application server provides support to link and distribute the newest data requested form the client server. The delivery of information and operation of servers, between the client server and the application server, should be implemented organically, and to do so, existing systems, such as database, CAD system, ERP system, KMS, support and management system, are reutilized as you can see in Figure 1.

4 Evaluation of the Proposed System

The framework for the support system of offshore outfitting design engineering suggested by us is presented in Figure 2. It has been devised by interfacing with systems, such as engineering system, CAD system, ERP system, KMS system, and web portal system, so that users utilize additional information, which is necessary in ship design engineering. The framework's structure includes client server, application server, and engineering database. The client server is regarded as the core of the framework for supporting system of offshore design engineering. We have designed the client server, which includes six modules, such as switching module, work scheduling module, user analysis module of which function is to analyze user information, task sharing module, community module, and messenger module. The application server is comprised of three types of modules: distribution module, which allows users to be provided with the latest data, GUI XML module, which helps to design processes based on each specific field, and system environment module, which functions to manage the whole system and provide the optimal engineering work environment. The engineering database server is to manage information necessary for system operation and data, which are able to analyze the current status of content use. Furthermore, the server enables a rapid provision of information and its accurate acquisition by sorting the information derived from engineering tasks and by recording knowledge on URLs.

The Figure3 shows the developed system to support for the offshore plant design engineering. Top of the system include logo image, system name section to show the logging on business field and information of the person in charge. Left is common menu. That shows the name of user, schedules for their design tasks, information of CAD system and bulletin board information. Bottom of the system consist of bookmark, knowledge share function, email link and search menu. In the bottom of common menu, there are tools for system operation and configuration files for the systems. In the center area of the system, user can compose to adapt for their purpose. The contents of the 'Design Information' consist of 'Common Technique Management', 'User Manual', 'Project Tasks(drawing)', 'Project Tasks(non-drawing)', 'Outfitting Design Tools', 'Non-Project Related Tasks', 'Etc Tasks', and 'Common Data'. These are production information for offshore design. And the contents of 'Common Technique Management' consist of outfitting and hull common information management like division of works information for the technique management, job process information, and etc. The 'User Manual' consists of user guides for each CAD system, task manual for outfitting equipments, ERP manuals, and etc. The 'Project Tasks(drawing)' consists of drawing related standard record/plan, work process diagram and design basis. And 'Project Tasks(non-drawing)' consists of mechanical equipment information, integrated purchase code and technical documents for offshore project. 'Outfitting Design Tools' is group of software tools for outfitting design. 'Non-Project Related Tasks' consist of Designer Hand Book, DSQS, Rule/Regulation, Terms for ship and marine engineering, project result information and international standard information. At last, 'ETC Tasks' and 'Common Data' have useful software and company in-house system, educational data and ISO9001 information.

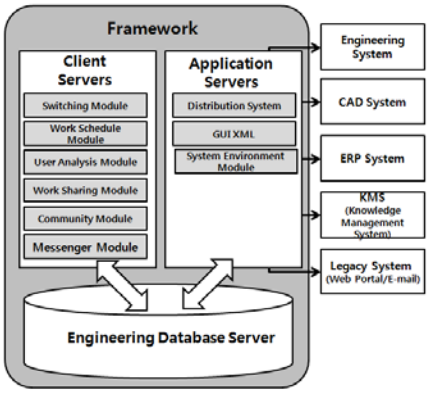

Fig. 2. Design of Framework

Fig. 3. Results of development system

5 Conclusions

Due to offshore outfitting design's variety and complexity, the existing engineering methods tend to waste time in searching for the standardized method and knowledge or to cause errors on tasks. It is presented in this paper that the work efficiency has been improved in the proposed engineering support system. This is because when users want to structure menus and use necessary functions, they are able to immediately apply such advantages to their tasks, resulting in a development of the functions for each area of tasks. Our further research is to extend this proposed system to outfitting design and we will build a work environment in which all engineering tasks and CAD data are processed under one system. We named this system the 'Smart Design Engineering System'.

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