

## Structural Analysis for MR. sized Oil Tanker applied Common Structure Rule

*Jun-Kee Bang<sup>†\*</sup>, Ha-Young So, Kyu-ho Lee<sup>\*</sup>, Sung-Kwang Shin<sup>\*</sup>, Young-dal Choi<sup>\*</sup>*

Shipbuilding & Ocean Research Institute<sup>\*</sup>  
Chang-Won, Kyoung Sang Nam Do, Korea

### ABSTRACT

After CSR is in effect, a matter of concern is how many to increase in terms of weight due to apply it to the ship and what differences it is comparing between existing rule and CSR rule. The concepts of CSR are to make the ship safer, more robust, and the design requirement clearer. Furthermore it pursues longer life of ship in fatigue strength. By the reasons of those, most of requirements are stronger than before. Therefore many part of ship should be reinforced and the weight of ship can be increased. Under those circumstances, the builder should make an effort to define the CSR and to find the methods to manage well this situation. In this study, we performed 3D Cargo hold and fine-mesh F.E analysis and deduced a conclusion and introduced new detail design.

### KEY WORDS

CSR(Common Structure Rule), 3D Cargo hold analysis, Fine-mesh F.E analysis.

### INTRODUCTION

After issuing CSR (common structure rule), busy movements have been started in the shipyards which have received the orders for double hull oil tanker. The objectives of this rules are to establish requirement to reduce the risks of structure failure to help improve safety of life, environment and property and to provide adequate durability of the hull structure during the design life. So there are several differences between existing rule and CSR.

Due to increase of corrosion addition, there are large amount of weight deviation between existing rule and CSR. Under that circumstance, the designer try to keep the weight same as existing vessel or reduce it by optimized structure design.

### Structure Analysis

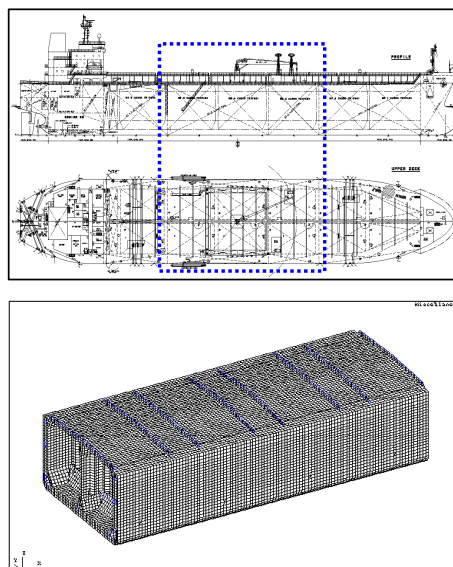
In this study, 3D cargo hold and fine-mesh analysis for 51k DWT product oil tanker was carried out. And Consideration for differences between existing ship and the ship which CSR was applied as well as

for structural improvements.

MSC Patran, Nastran and SDA(structural design assessment made by Lloyd's Register) were used for pre-process, solver and post process respectively.

### 3D-Cargo hold analysis model

In the 3D cargo analysis, the longitudinal extent of the mid-ship cargo tank finite element (FE) model is to cover three(3) cargo tank lengths about mid-ship.



**Fig.1 3D Cargo Hold Model**