Introduction of Structural Design and Construction of FLNG

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ABSTRACT

The natural gas demand has been increased and forecasted to be 1.5 times higher in 20 years. In order to comply with market needs, DSME (Daewoo Shipbuilding & Marine Engineering) has developed a LNG (Liquefied Natural Gas) FPSO (Floating, Production, Storage and Off-loading) to monetize mid-scale standard gas fields. Since the Fukushima nuclear accident happened in Japan in last March 2011, the world’s attention and demand on LNG fuel has been increasing more and more. In this situation, DSME has had the opportunity to produce the world’s first FLNG facility combining LNG carrier and FPSO.

The aim of this paper is introducing of the detail structural design and engineering for structure discipline, also, the construction process and sequence of FLNG (Floating Liquefied Natural Gas). Characteristics of FLNG, DSME’s outstanding features and comparison of conventional LNG and FLNG are briefly explained, too.

KEY WORDS: FLNG (Floating Liquefied Natural Gas); FPSO (Floating, Production, Storage and Off-loading); LNGC (Liquefied Natural Gas Carrier); 2 (two) rows CCS (Cargo Containment System)

INTRODUCTION

FLNG is high value-added vessel which can be solved production, treatment, liquefaction and storage at once because FLNG is equipped with both production facility and liquefaction facility. After purification of the mixture composed of water, oil, LNG and LPG gas, etc., LNG and Condensate will be stored in cargo hold. Since then off-loaded LNG to the shuttle from FLNG will be served to gas users.

In order to satisfy the storage tank capacity, the width of the ship is increased 1.5 times compared to the existing equivalent LNGC and 2 (two) rows cargo containment system of a new concept are applied. 10 (ten) utilities and 11 (eleven) process modules are installed on the topside. This vessel will be installed near the Malaysian field and produced LNG during 20 years without any break.

The client of this project is Petronas & MISC JV and this project is performed by consortium comprising of Tecnip Geoproduction, Tecnip France and Daewoo Shipbuilding & Marine Engineering. The flag and class is Malaysia and DNV, respectively. Figure 1 shows the world’s first FLNG facility built in DSME.

Main dimension of this unit is as below;
- Length O.A. : Approx. 320 m
- Length B.P. : 300 m
- Breadth MLD : 60 m
- Depth MLD : 33 m
- Draft (Towing/Scant.) : 9.0/16.5 m

Main capacities of this FLNG are as below;
- Production : 1.0 MTPA (Million Ton Per Annum)
- Storage : 177,000 m³ (4 (four) pairs LNG Tanks)
  19,400 m³ (2 (two) pairs Condensate Tanks)
- Modules : 6 (six) Inlet & Pre-treatment Modules
  8 (eight) Liquefaction Modules
  6 (six) Utilities Modules
  1 (one) Flare Modules

Fig. 1 Model of the world’s first FLNG facility