

IPTC-12445-PP

An Insight into the World's Largest LNG ships

Abdulla Khalid Al-Kubaisi, Qatargas Operating Co. Ltd

Copyright 2008, International Petroleum Technology Conference

This paper was prepared for presentation at the International Petroleum Technology Conference held in Kuala Lumpur, Malaysia, 3–5 December 2008.

This paper was selected for presentation by an IPTC Programme Committee following review of information contained in an abstract submitted by the author(s). Contents of the paper, as presented, have not been reviewed by the International Petroleum Technology Conference and are subject to correction by the author(s). The material, as presented, does not necessarily reflect any position of the International Petroleum Technology Conference, its officers, or members. Papers presented at IPTC are subject to publication review by Sponsor Society Committees of IPTC. Electronic reproduction, distribution, or storage of any part of this paper for commercial purposes without the written consent of the International Petroleum Technology Conference is prohibited. Permission to reproduce in print is restricted to an abstract of not more than 300 words; illustrations may not be copied. The abstract must contain conspicuous acknowledgment of where and by whom the paper was presented. Write Librarian, IPTC, P.O. Box 833836, Richardson, TX 75083-3836, U.S.A., fax +1-972-952-9435.

Abstract

Description.

Korean shipbuilding is buzzing with talk around the large LNG (Liquefied Natural Gas) vessels being constructed there. The collaborative efforts of Qatargas 2 and ExxonMobil have achieved a breakthrough in the LNG shipping industry by developing, contracting and implementing a new generation of the largest, most efficient LNG ships.

The first series, Q-Flex, has a capacity of 210,000 cbm, and the first of these vessels was delivered in September 2007. The next series, Q-Max, will be the world's largest LNG ships with capacities up to 266,000 cbm. The Q-Max vessels have been ordered by Qatar Gas Transport Co Ltd (NAKILAT) for the fifth train of the Qatargas 2 project, and the first vessel is to be delivered at the time of writing in the Korean Samsung shipyard.

Applications.

This paper will discuss the challenges and opportunities of the biggest single directly connected LNG shipbuilding project in the world and how the project encouraged improvements in quality and productivity without compromising the safety as the highest priority.

Results and Conclusions.

The primary focus will be on speed, fuel consumption, maneuvering characteristics and global vibrations. Enhanced operational safety and sharing of lessons learned will also be reviewed for the LNG vessels' future consideration. Finally, operational feedback from the trading Q-Flex vessels plus sea trial data for the Q-Max ships will be investigated and reported by comparing the results against the original design basis.

Technical Contributions.

With the application of several cutting edge technologies for LNG ships, along with the optimization of marine systems

such as adapting the first prototype re-liquefaction plant, this new generation of ship represents a significant step change in reducing the cost for delivery of LNG to markets worldwide.

Introduction

It's been almost five years since the concept of larger LNG vessels was initially mooted. Today the world has witnessed that the cargoes are being safely loaded and transported to discharge terminals obliging our customers in Japan, Korea, Spain and more planned exports worldwide. Our new vessels ventured with commissioning spot cargos for New Mexico, Sabine Pass (US) and were successfully delivered. This marks a significant milestone in a journey that one might argue has transformed LNG shipping and reset the redefined possibilities.

The primary goal of the industry has always been to transport LNG safely in the pursuit of sustaining flawless performance. However, mitigating the environmental impact by reducing emissions along with safe, efficient, cost-effective transportation, it became apparent that those challenges would definitely require some radical rethinking.

The design basis adopted at inception for the new large LNG carriers, both Q-Flex and Q-Max, was the delivery into service a series of vessels would be to meet or beat the 'conventional' LNG carriers in safety, reliability, efficiency, operability and maintainability.

The significant technology innovations have allowed adoption of twin screw slow speed diesel engines in place of single screw steam turbines and reliquefaction for the handling of Boil-off Gas (BOG) instead of burning it for the propulsion system. These were the major highlights apart from the obvious size increase of these new Q-Flex and Q-Max vessels that has increased the capacity by approximately 50% and 80% respectively. It is these areas that have generated the most interest within the industry and are the focus of this paper.

Speed.

At writing, 16 Q-Flex vessels, consisting of three slightly different hull designs, have been delivered to trade and have impressively confirmed target performance. Both vessel designs were independently tested at the SSPA model basin in Malmo Sweden. The curves in Figure 1 show the speed/power relationship predicted by model tests for the two designs (dotted lines) and the average speeds at design draft (12 meters) derived from sea trial results.