



**BUREAU
VERITAS**

VeriSTAR NEWS

NEWSLETTER OF THE MARINE DIVISION
APRIL 2009

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FOREWORD

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Vice President, Sales and Marketing Management



Despite the recent current credit crunch, the world economies still want clean energy. This is why the development of new LNG import and export terminals, especially offshore terminals, continues to flourish.

The liberalisation of gas markets has also opened the way for more flexible trading in the LNG industry.

The market requires industry to meet enhanced technical challenges such as the design and the operation of gas terminals and ships for the highly demanding Arctic environment. They must work in extremely cold weather, very harsh seas and winds and heavy ice yet be highly sensitive to pollution and self-sustaining.

For more normal shipping a large number of liquefied gas carriers were delivered in 2008 as a result of the peak orders placed between 2004 and 2006. Bureau Veritas is closely engaged in high level classification and technical assistance services to the LNG shipping and the offshore industries so that both existing ships and the means to meet future technical and operational challenges maintain the high safety standards achieved so far.

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→ NEW FRONTIERS

ARCTIC ACCESS ANSWERS



Increased access to the Arctic region is increasing traffic there and creating demands for new vessels and new technologies. The Arctic contains large offshore oil and gas reserves and their development is rapidly increasing.

A variety of ships suitable for Arctic conditions is needed including oil tankers, FPSOs, gas carriers, FLNGs, dry cargo ships and specialised cruise ships. Ship designs need to fulfil a number of technical requirements regarding hull form, ice strengthening, propulsion power and winterisation.

New designs for Arctic navigation are being developed. Icebreaker-independent navigation, often applying the double acting concept, is now common, and the search for economies of scale is pushing demand for larger ships. Each of these developments has its own technical challenges which are not always covered by the existing regulations.

As a class society Bureau Veritas has been taking this issue very seriously and has set up an extensive R&D programme into Arctic navigation. This programme builds on an extensive knowledge base, as it is being executed in close cooperation with leading institutions in Arctic shipping, such as Aker

Arctic and the St Petersburg State Maritime University. Combined with BV's extensive knowledge and experience with ice-classed ships and offshore units the programme is intended to provide shipowners and designers with valuable guidance for their Arctic projects. This guidance will be provided in the form of guidance notes, calculation software for design and operational purposes and updated class rules.

Assessment of ice conditions including ice type, distribution, thickness and sea and air temperature distribution for vessels operating in Arctic waters has been completed. This data is now in use for developing a first principle approach for determining ice loads on the ship's hull and appendices and the associated ice strengthening required, as well as for formulating requirements for the main machinery and propulsion. BV's recently developed winterisation requirements are also under review in order to take into account feedback from use in Arctic operation.

Offshore platforms will be key vehicles for the Arctic exploitation of gas, and BV is very active conducting engineering studies for the key players, including a Russian offshore project.

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CLIENT PROFILE

RUNNING ON GAS



Peter Justesen,
Lauritzen Kosan

Lauritzen Kosan has come a long way in a relatively short period of time. In the past few years it has progressed from being a specialist in coastal European trades involving 3,000 to 6,000 cubic metre gas carriers to a truly global operator of sophisticated LPG and ethylene carriers of up to 9,000 cu m, and a byword in the safe and efficient international transportation of liquefied petrochemical gases. It has an unsurpassed record of safety and reliability in handling these volatile cargoes, and the gas carriers now entering its fleet are among the industry's most technologically advanced and environmentally friendly vessels. It also enjoys an excellent working relationship with Bureau Veritas, whose expertise and experience has been essential to the development of the Lauritzen Kosan fleet.

Peter Justesen has been Vice-President of Lauritzen Kosan for a little over two years. He has primary responsibility for the technical management of a fleet of thirty gas carriers. Peter's background encompasses marine engineering, oceanography, hydrodynamics and bridge simulator technology, among other

things, but he sees his role at Lauritzen Kosan as his biggest career challenge to date.

"I have responsibility for managing a fleet of thirty LPG and ethylene carriers ranging in size from 3,500 to 9,000 cu m," explains Peter. "That means making sure that the company has the necessary resources for operational and developmental purposes, and the ability to meet the expectations and high standards demanded by our customers, who tend to be the big oil majors and other, similar companies.

"We are happy to live up to those standards, and those of the industry regulators, and to go beyond them where possible. We have to pass vetting inspections, and meet customer approval. We also impose high standards on ourselves as a company, so that all makes for a very rigorous system of control, which can only be a good thing."

Lauritzen Kosan has been working with Bureau Veritas for more than five years, and Peter says

that BV's contribution to the development of the fleet has been pivotal. "BV is a very important business partner for Lauritzen Kosan," he explains. "Its interest in, and willingness to support, new ideas and designs has been absolutely invaluable, and is typified in Lauritzen Kosan being awarded the Lloyd's List Ship of the Year 2008 award for engineering and environmental innovation.

"We currently have a series of ten 8,000 cubic metre ethylene carriers building at Ulsan, Korea, all to BV class. We greatly value the experience, enthusiasm and flexibility of BV as we continue to build efficient and environmentally friendly vessels for the world market. BV has a quality workforce which is always willing to discuss new ideas, and ready to come forward with possible solutions to any problems which may occur.

"I am sure there will be new technological challenges in the years ahead, new technical innovations to consider, and we look forward to working on these with BV."



TECHNICAL FOCUS

INTEGRATED MODELLING SPEEDS FPSO CONVERSION



conversion of a 308,000 dwt pre-IACS VLCC hull into an FPSO for South Atlantic Holding (StatoilHydro) for operation 60 miles off the Brazilian coast in 100 m water depths.

The design called for a 30-year life span on site for the FPSO. A number of engineering companies performed design studies for offshore specific structures, structural modifications and interfaces with the hull of the converted VLCC. The resulting design was passed to Bureau Veritas for assessment.

Hydrodynamic, mooring and heading analyses provided the extreme load parameters and the

fatigue loads for transit and site conditions. At several stages during the design phase integrated models of the hull and offshore specific structures were used to assess the yielding, buckling and fatigue strength performance of the whole unit.

A complete model of the vessel was built to represent the interaction between various components of the FPSO unit. The deterministic approach was used to scan the fatigue details allowing to apply the full spectral methodology on the most sensitive spots.

➔ NEW RULES

NEW RULES FOR OFFSHORE GAS TERMINALS



Bureau Veritas has completed the first phase of a rule development project for the classification of floating offshore gas terminals. The results will be published in guidance note NI542 in May 2009. Combining BV's experience with the classification of liquefied gas carriers and FPSOs, this document provides requirements for structural safety and cargo containment system assessment. These requirements are applicable for offshore units including LNG FPSOs, FSRUs, gas production units or FSOs.

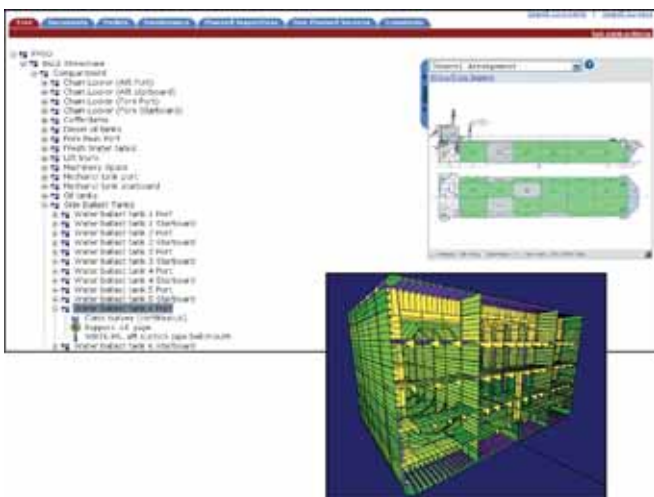
The guidance note covers various types of containment systems for liquefied gases including integral tanks, membrane tanks and IMO types of independent tanks. The design loads are calculated through direct hydrodynamic analysis. Particular attention is given to the evaluation of sloshing loads for membrane tanks. Structural criteria are based on a semi-probabilistic approach, with safety factors corresponding to the offshore environment. Assessment of the hull and cargo tank structure and supports through a 3D finite element model is mandatory, and specific requirements for structural modelling, load modelling and different criteria to be applied are provided in the note.

Later this year BV will publish specific requirements for subdivision and stability, electrical installations, piping systems, equipment, fire safety and topsides of offshore gas terminals.

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➔ NEW TOOLS

VERISTAR HLC BEEFS UP AIMS



interactively entered and stored in the model. Based on the initial thickness and the introduced measured value, VeriSTAR HLC can provide a condition assessment, displayed in a colour scale. It can even indicate if the measured element is in compliance with Bureau Veritas' Corrosion Rules.

The addition of VeriSTAR HLC to the existing Asset Integrity Management System provides a tool to incorporate and follow up detailed inspection

results. Once the updated HLC model has been uploaded into the AIMS database it can be post-processed by the integrity management team to define actions required even before the inspection team has left the unit.

HLC models are built in Femap so it is possible to create finite element models linked to the geometrical HLC model even after the latter has been updated with thickness measurements.

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After several years of practical experience with the VeriSTAR Asset Integrity Management System (AIMS) in most of Total's floating units, a new electronic tool, VeriSTAR HLC, is ready for the definition and follow-up of inspection programmes for Floating Production Systems.

VeriSTAR Hull Life Cycle (HLC) is more than a simple viewer of a detailed 3D model of the unit. Data such as thickness measurements, crack information and coating conditions can be

...NEWS IN BRIEF...

➔ **Bureau Veritas Environmental Seminar 2009** will take place in Hamburg on April 30th, 2009 and will address the key points of the new international regulations on environment and possible solutions to meet the associated challenges...

➔ **Bureau Veritas has formed a Joint Industry Project (JIP)** with LR and ABS for the harmonisation of class rules for tugs. The focus is on a common approach towards



safety-related issues, such as towing stability, escort operations, towing winches and safety equipment. The project is being carried out in close cooperation with industry stakeholders under the umbrella of the SafeTug II JIP and will be submitted to IACS...

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➔ **Bureau Veritas has issued Guidelines on ice reinforcement selection in different world navigation areas** (NI 543) to help yards, owners and designers to understand the applicable requirements, as well as the



equivalency and differences between the different sets of class and statutory requirements, which is essential for a successful Arctic shipping project...

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➔ **A new BV Guidance Note for Lay-up of Ships** (NI 543), to be published in May, aims to help owners protect their assets during lay-up. It sets out how owners may obtain a "Lay-up attestation" from BV. It includes recommendations for the choice of the type of lay-up, safety conditions, preservation measures, lay-up site and mooring arrangements...

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→ BV EVENTS

FOURTH LNG CARRIER DELIVERED TO AP MOLLER-MAERSK

The 165,500 cu m LNG carrier *Maersk Magellan*, fitted with a Mark III containment system and dual fuel diesel-electric propulsion, fourth of a series of six vessels built with BV class by Korea's Samsung Heavy Industries, was delivered to Copenhagen-based AP Moller-Maersk in April 2009. The first three ships, *Maersk Methane*, *Maersk Marib* and *Maersk Arwa*, were delivered last year. The last two are to be delivered later this year. *Maersk Magellan* is about 285 meters long with a beam of 43.4 meters and a depth of 26.6 meters. It is fitted with two ABB synchronous electric engines delivering 26,500 KW taking the vessel speed up to 19.5 knots.

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Maersk Arwa, sistership of Maersk Magellan

→ BV EVENTS

TWO MORE LNG FOR MISC BERHAD



Seri Balqis

The 157,000 cu m LNG carriers *Seri Balqis* and *Seri Balhaf* were delivered in January and March 2009 by Japan's Mitsubishi Heavy

Industries to Malaysia's MISC BERHAD. The vessels are MHI's first dual-fuel diesel-electric LNG carriers. ✉ othman.kadir@my.bureauveritas.com

→ BV EVENTS

AKPO FPSO & ALIMA FPU



Alima FPU

The 2m bbl *Akpo* FPSO and the *Alima* FPU were recently delivered to Total by HHI for service offshore West Africa and were covered from conception by BV VeriSTAR AIMS Asset Integrity Management System.

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→ BV EVENTS

CORAL METHANE DELIVERED

Dutch owner Anthony Veder took delivery of the 7,500 cu m LNG/LPG/Ethylene carrier *Coral Methane* mid-April from Poland's Remontowa Shipyard.

This unique vessel has specifically been designed for regional distribution and when it is not transporting LNG it can be used to transport other gases such as liquefied petroleum gas (LPG) and petrochemical gases, including ethylene. The LNG will be transported at minus 163°C and the vessel is very environmentally-friendly as it will use the LNG as fuel, significantly decreasing emissions.

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