DNV Maritime News

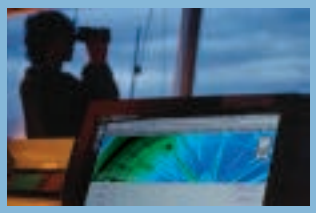
Information from DNV to the maritime industry No. 1 April 2007

Another container ship to DNV class

List of contents

page 6
Increased focus
on hull integrity

page 11
Joint DNV and CCS
technology institute



page 12
One step ahead
in port clearance

Front cover: Arne Solevåg, one of DNV Maritime's surveyors in Ningbo, China, took the photo while watching the launch of *Cosco Fuzhou*, another container vessel to DNV Class.

Ship Classification and more

DNV is one of the world's leading classification societies, and has worked to improve safety at sea since 1864.

DNV currently classifies more than 5,200 vessels totalling more than 115 million grt. This constitutes 16 per cent of the world's fleet in tonnage terms.

Ship Classification is a system for safeguarding life, property and the environment at sea. It entails verification against a set of requirements during design, construction and operation of ships and offshore units. These requirements are based on the accumulated experience from DNV's large classed fleet, research and development and more than 140 years of experience. Our surveyors stationed around the world work with customers to ensure compliance throughout the lifetime of the classified object.

Maritime Solutions
DNV Maritime Solutions specialises in technology and business risk consulting for customers in the maritime industry. We have a strong base in DNV's technological competence and experience, international presence and independence.

Petroleum Services
DNV Petroleum Services (DNVPS) is the foremost name in marine fuel management, commanding over 70 per cent worldwide market share for contracted Fuel Quality Testing services. We are also a major provider of Bunker Quantity Surveys.

Registers
DNV Maritime's registers, including up-to-date vessel class and survey status, Register of Vessels, Class Suspensions and Withdrawals, Approved Service Suppliers, and Approved Manufacturers and Products.

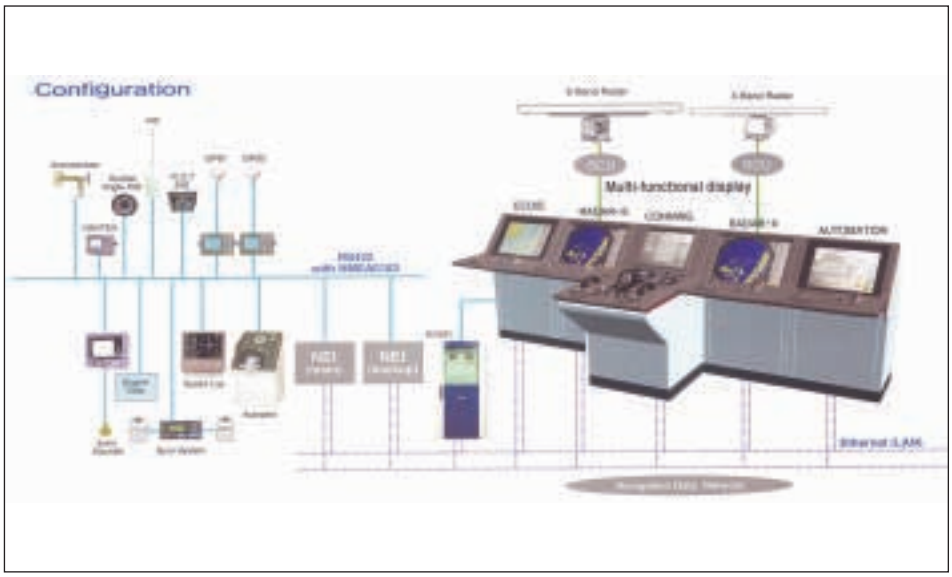
Statutory Certification
DNV operates a worldwide network of survey stations and is authorised by more than 120 flag administrations to carry out surveys and, in most cases, issue statutory certificates on their behalf.

Contact us
We have specialists available to answer the questions that you may have.

www.dnv.com/maritime

Latest news – see www.dnv.com/maritime

First type approval for an Integrated Navigation System



With the aim of standardising ship building, DNV has type approved an Integrated Navigation System (INS) for Hyundai Heavy Industries & Transas Ltd.

Imagine the following scenario: You have your driver's license, but every single car has different solutions for steering, breaking and gearing. Each time you get in a new vehicle you have to learn how to drive it all over again. Not even two Toyota Corollas are alike! The example might seem far-fetched and humourous, but this is exactly what has been and is the case in the shipping industry.

Says approval engineer Olaf Gundersrud from Nautical Safety & Communication Systems in DNV Maritime: "Traditionally, the design and arrangement of the ship's control centre has been decided by design offices, shipowners and various equipment manufacturers as they see fit. The consequence is that every bridge has its own design. The lack of standardisations results in elevated risks for human errors.

"When DNV was approached by Hyundai Heavy Industries in 2004 and asked to type approve an INS, DNV saw this as a great opportunity to contribute to standardisation in the maritime industry," says Olaf Gundersrud.

Based on International Maritime Organisation (IMO) performance standards and drafts of international standards from International Electrotechnical Commission, DNV started the process with testing and verification.

In addition to the international maritime standards, both Hyundai & Transas also wanted a DNV certification as a Grounding Avoidance System applicable for the Nautical Safety class notation NAUT-AW. The ACEA office handled the early phase of the project while testing was conducted by personnel from Høvik.

The type approval certificate is currently the world's one and only for an INS.

DNV for NYK

DNV has certified NYK Line's new training centre in Singapore. NYK Line considers the centre a vital part of their efforts to enhance the education of officers and crew.

DNV's certification of the centre, including advanced equipment as NYK Line's new cargo simulator for VLCCs, confirms the excellent cooperation between the two global companies.

NYK-Singapore's Chairman and CEO, Takamaru Ishida, who received the certificates from DNV during a visit to DNV's headquarters at Høvik, stressed NYK's efforts for better education and enhanced safety. He expressed his appreciation for the good cooperation with DNV and the professional contribution from DNV's auditor: Captain Aksel Nordholm.

"The rapid growth of the world fleet will increase the demand for competent crew," says Head of DNV SeaSkill Erling Linna. "Training centres need to improve both their quality and efficiency to meet this demand, and NYK is setting an important example."

The certificates were presented to NYK-Singapore's Chairman and CEO, Takamaru Ishida, by DNV Maritime's technical director Olav Nortun.

SOLAS regulations II-1/3.2

Performance Standard for Protective Coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of Bulk Carriers – issued 19 March 2007

This report contains DNV's overall interpretation of the consequences of the many new statutory requirements impacting the shipping industry today. Our goal is to help our customers stay up to date, while at the same time clearly state what DNV understands to be the motivation behind the changes, and point out the most important changes.

Please note that the interpretations of the rules and regulations made by DNV and presented in this report are generic, meaning that special exceptions or novel designs are not included. To obtain information regarding such special cases, please contact DNV's experts listed in the contact section of this report.

Please also note that different IMO member states (flag states) or regulatory bodies may interpret statutory regulations in slightly different ways. DNV cannot guarantee that other bodies will interpret the relevant rules and regulations in the same way as described in this report. DNV therefore disclaim any liability for loss or damages arising as a consequence of a differing interpretation of the rules and regulations made by any other body.

Introduction

A Performance Standard for Protective Coatings (PSPC) for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers has been developed by IMO, providing technical requirements for new constructions.

Motivation

Improved corrosion prevention in seawater ballast tanks in all types of ships and in doubleside skin spaces of bulk carriers as coating of them, is considered to be a safety issue.

Regulation text

The SOLAS II-1, Regulation 3-2; "Corrosion prevention of seawater ballast tanks in oil tankers and bulk carriers", has been amended. In brief implying the following:

New title: "Performance Standard for Protective Coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers"

Amendment: All dedicated seawater ballast tanks in all types of ships of not less than 500 gross tonnage and double-side skin spaces in bulk carriers of 150 m in length and upwards shall be coated during new construction in accordance with the PSPC.

In addition, maintenance is now addressed in the above mentioned SOLAS regulation, and the effectiveness of the protective coating system shall be verified during the lifetime of a ship by the Administration or an organisation recognised by the Administration, based on the guidelines developed by the IMO. Do note that the guidelines for maintenance remain to be developed, but this work is addressed in a correspondence group established at IMO Design Equipment DE50.

Enter into force of the amendment:
For ships of 500 gross tonnage and above:

1. for which the building contract is placed on or after 1 July 2008, or
2. in the absence of a building contract, the keels of which are laid or which are at a similar stage of construction on or after 1 January 2009, or
3. the delivery of which is on or after 1 July 2012.

Status

The SOLAS II-1, Regulation 3-2 and PSPC referred to, was adopted at MSC 82, 8th December 2006. The dates for entry into force are given above.

For vessels covered by the IACS Common Structural Rules (CSR), i.e. oil tankers and bulk carriers, the PSPC *entered into force immediately after adoption by MSC 82.* To support uniform implementation of the PSPC for CSR vessels, IACS have developed and issued the Procedural Requirement no. 34, see below links:

- http://www.iacs.org.uk/document/public/Publications/Procedural_requirements/PDF/PR_34_pdf388.PDF
- http://www.iacs.org.uk/publications/CommonRulesDoc.aspx?pageid=4&sectionid=2&linkid=8

Requirements in the performance standard

The PSPC applies only to dedicated seawater ballast tanks in all types of ships and to doubleside skin spaces in bulk carriers which are constructed of steel. DNV will prepare a Class Notation to document compliance with PSPC.

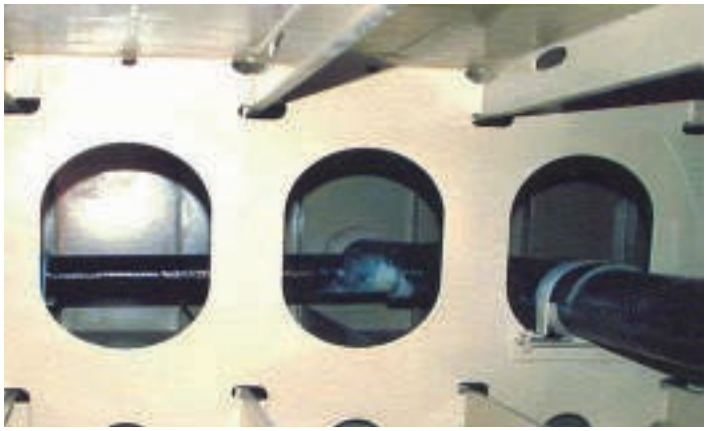
The PSPC is based on a detailed specification and requirements which intend to provide a target useful coating life of 15 years, which is considered to be the time period, from initial application, over which the coating system is intended to remain in "GOOD" condition. The actual useful life will vary, depending on numerous variables including actual conditions encountered in service.

The coating application (including steel surface preparation) shall be followed up by:

1. Coating system approval: Statement of Compliance/Type Approval, issued by third party, see section 5 of the standard

2. Inspection agreement: Inspection of surface preparation and coating processes shall be agreed upon, between the ship owner, the shipyard and coating manufacturer, and shall be submitted to the Administration for review, see section 3.2 of the standard.

3. Coating inspection: To be carried out by qualified coating inspectors certified to



NACE Coating Inspector Level 2/FROSIO Inspector Level III or equivalent, during coating process, to ensure compliance with the PSPC. See section 6 of the standard. Results to be included in the Coating Technical File (CTF).

4. Verification: To be carried out by the Administration or a recognised organisation, consisting of reviewing the Coating Technical File, checking the Technical Data Sheet and coating system approval, coating identification on representative containers, coating inspectors qualifications and reports. Additionally, implementation of the coating inspection requirements shall be monitored. See section 7 of the standard.

A Coating Technical File (CTF) shall be prepared and shall include specification of the coating system; record of the shipyard's and ship owner's coating work, detailed criteria for coating selection, job specifications, inspection, maintenance and repair. A Joint Working Group (JWG) consisting of Owners, Yards, Coating Manufacturers and Class has been established to agree upon an industry standard for implementing PSPC and will consider a common template for CTF based upon amongst other a proposal made by DNV.

Consequences for external customer

Yards:

- Only use pre-qualified coating systems
- Prepare Coating Technical File (CTF) including Inspection Agreement
- Possible upgrade of production system
- Documentation of coating inspectors' qualifications;
  – Train/hire qualified coating inspectors
- Increased involvement from Administrations (i.e. Class Society for Common Structural Rules vessels)

> *Construction time may increase*

Owners:

- Maintenance:
  – recorded in CTF & kept onboard
  – efficiency of coating to be verified by Administration
- Better prepared for evaluation by oil companies, e.g. Vetting and Rate (A)
- Cost increase - however at same time, reduced life-cycle costs and better second-hand value of vessel!

> *Increased safety*

Coating manufacturers:

- Supply pre-qualified coatings systems for water ballast tanks

Consequences for Class

Verification as per section 7 of the standard will be required by the Administration or a recognised organisation. Additionally, the Administration shall review the agreement on the procedures for inspection, and if required, participate in the agreement process. Training will be needed.

- Reviewing; Inspection Agreement and CTF
- Checking
  – Technical Data Sheet & coating system approval
  – coating identification on representative containers
  – coating inspectors qualifications & reports
- Monitoring; Implementation of coating inspection requirements

To document compliance with PSPC, DNV will extend the COAT notations (COAT-1 and COAT-2) with a new variant named: COAT–PSPC(x). The letters in parentheses will denote different corrosion prevention systems, as follows:

(B) IMO PSPC requirements for water ballast tanks
(D) IMO PSPC requirements for double side skin spaces of bulk carriers.

As IMO develops further PSPCs, the notation will be expanded to include:

(V) IMO PSPC requirements for void spaces
(C) IMO PSPC requirements for cargo oil tanks
(M) Coating maintenance requirements

Other COAT PSPC(x) notations will be added as further standards are developed.

The class notations COAT-1 and COAT-2 will be gradually phased out following the development of new coating standards within IMO.

Contact information

MTPNO378@dnv.com Materials Technology and Pressure Equipment
Materials Technology and Pressure Equipment (MTPNO378):
Helge.Vold@dnv.com
Gisle.Hersvik@dnv.com

Class Services and New building (MTPNO870):
Sille.Grjotheim@dnv.com

Support services beyond class from DNV:
Increased focus on hull integrity

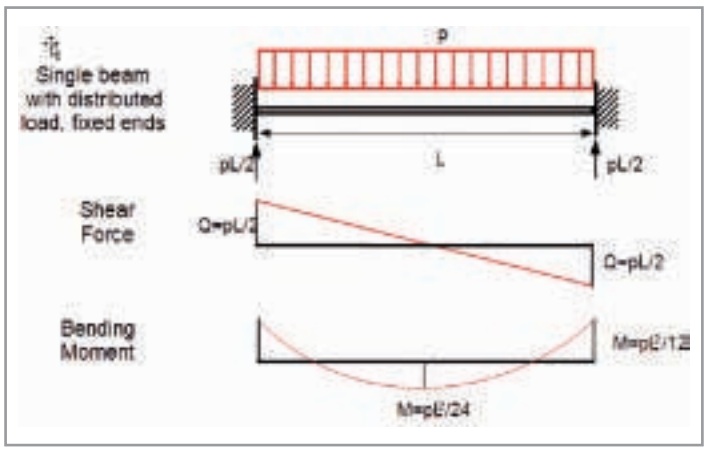
Cracks, corrosion, and other elements of structural integrity are main areas of attention for tanker owners. Lack of satisfactory hull integrity may have basic negative consequences, such as oil ingress in ballast tanks, pollution of the sea, port state detentions, fines, unscheduled (and expensive) ship repairs, and in worst case major accidents due to structural failure. This is also the reason why hull integrity receives such strong attention from charterers in connection with vetting. Excellent control of hull integrity is a hallmark of quality shipping.

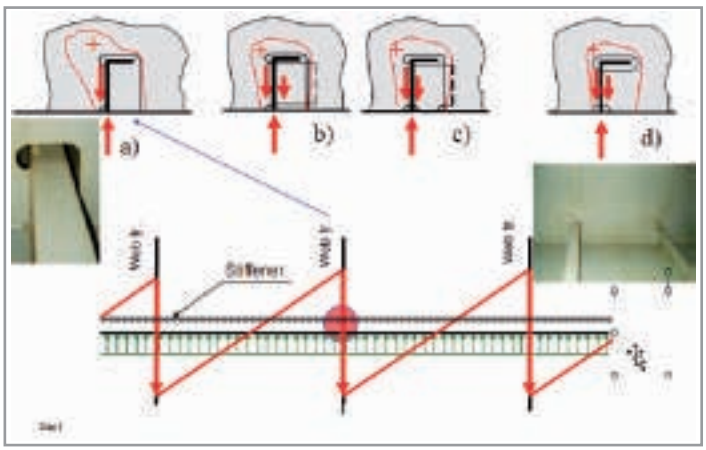
DNV actively support owners in improving their hull integrity efforts. We focus on some important elements where DNV's accumulated knowledge from classification of ship structures is shared with ship operators. These include key elements such as:

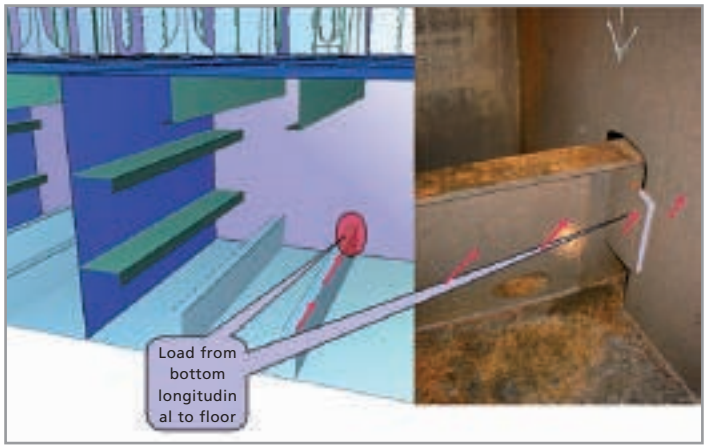
1. Owners' general structural understanding/competence (Hull Structure Course)
2. Tank inspection systematics, reporting and acceptance criteria (Tank Inspection Course)
3. Establishing ship-specific hull inspection programmes and information (Hull Inspection Manual)
4. Tool for systematic and consistent recording of inspections and results, evaluation of results, easy retrieval of reports and structural condition. (Nauticus Life Cycle Manager)

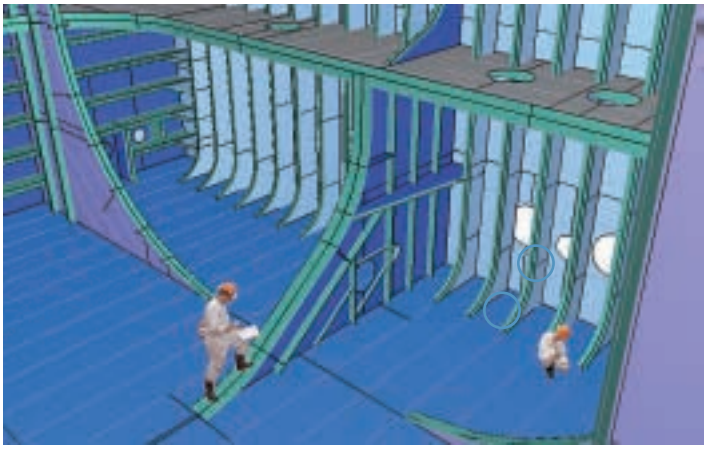
DNV has the past five years been heavily involved in assisting owners in establishing good systems for planned inspection and maintenance schemes based on elements 1–4 above. In this way we are able to effectively share our hull knowledge and experience with on board personnel, superintendents and other personnel involved.

The four elements above are described in more detail below.







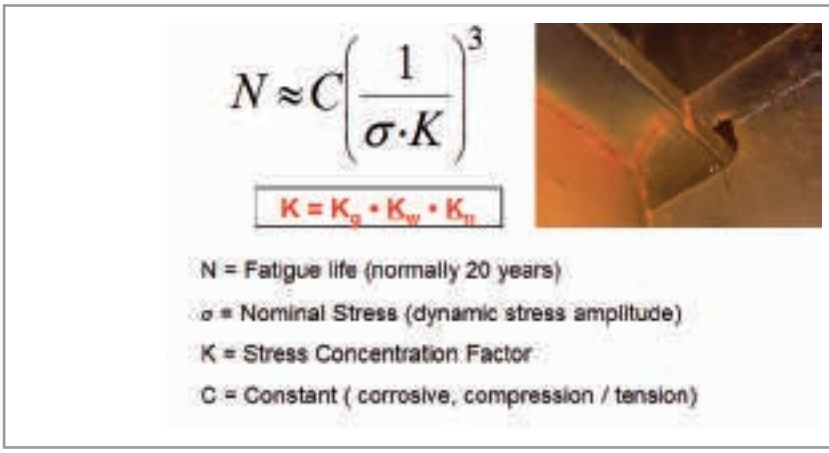


Hull Structure Course

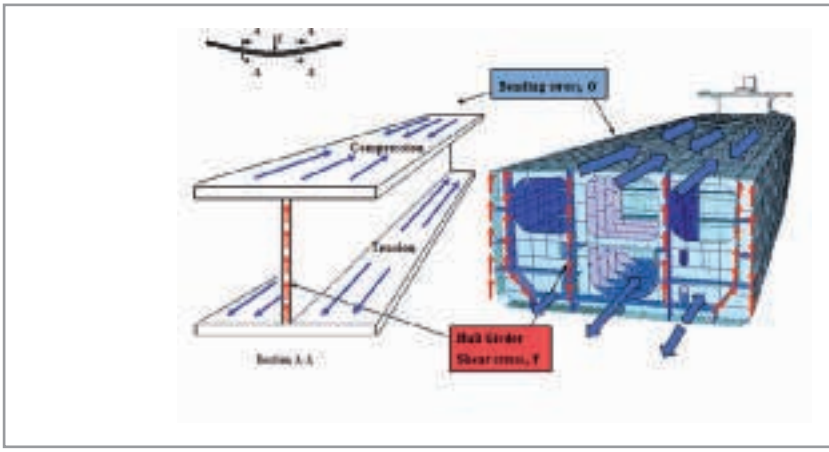
The technical department in shipowner's organisation has in many cases been reduced to cut cost. A general perception is that the competence in a typical technical department is strongest with respect to machinery and systems compared to hull and structure.

To meet the needs for more structural expertise, technical experts on hull structure working with ships in operation at DNV's Head Office in Oslo have developed a Hull Structure Course.

The objective is to give the participants increased understanding of the structural configuration and response of ship structures. The purpose of the course is to improve the quality of hull inspections and provide a sound basis for evaluating the criticality of structural defects. A key element in this course is to build an understanding of the strength response of a beam subject to different loads and end fixations. We also go into depth with regard to different failure modes such as corrosion, cracks, buckling and indents. This builds a generic strength approach which is then applied to different ship types. The typical damage for each ship type is discussed, with a focus on understanding the cause of damage and the impact the damage will have on the ship's strength response.



Simple fatigue life calculations.



The deck and bottom act as flanges in the 'hull girder', while the ship sides and longitudinal bulkheads act as the web.

Course agenda

Prior to attending the classroom course, the participants are invited to take part in a web primer, for some a chance to brush up on well-known facts and for others a good opportunity to get a head start on what they are about to learn for the first time. In addition, a one-day tanker course may be included if desired.

The one-day, ship-type-specific modules cover the build-up and function of the hull structure, the causes of typical damage, the consequence of damage and proposed repairs.

Technical managers, fleet managers and superintendents are target groups for these courses which can be conducted at the local DNV office or in the company's offices.

This course has been provided as in-house sessions for several of the major tanker owners throughout the international shipping community, such as Piraeus, Dubai, Singapore, Kuala Lumpur, Hong Kong, Rio de Janeiro …

Other players in the shipping industry such as vetting inspectors, Flag State and Port State inspectors have also attended.

So far, more than 1,000 participants have received training through our courses, which consistently attain high ratings.

The course is often referred to as 'the missing link' between the theory which has long been taught in universities and marine training centres and the real world experienced during inspections.

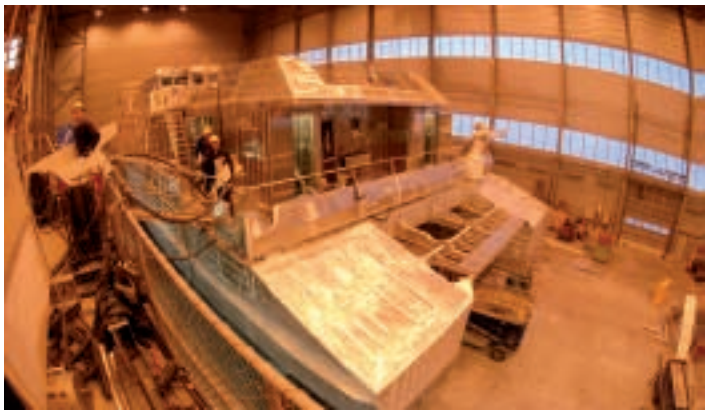
Building ships in aluminium

According to a recent survey by National Geographic, the Fjords of Norway are the world's premier tourist attraction. In one of these beautiful fjords, the Hardangerfjord, with snow-clad mountains as a backdrop in November, you will find the high speed and ferry manufacturer Fjellstrand. The factory was established in 1928 building small wooden boats for the local market, and are now supplying vessels to all parts of the world.

A shining aluminium hull for a new high speed ferry at Fjellstrand.

Asbjørn Tolo is the President of Fjellstrand. The Hardangerfjord in the background. The factory is located close to Bergen, Norway.

The 46m FlyingCats *Fjordkongen* and *Fjorddronningen* were delivered to Troms Fylkes Dampskibsselskap in 2005. Photo courtesy of Fjellstrand



Build for speed in aluminium.

Fjellstrand is a global brand name for international ferry operators, which know it to be a supplier of high-tech, high quality vessels built of aluminium. This is why we are including Fjellstrand in this issue, as it is at the end of the aluminium production chain – an end user of the product. We could have gone to any other end users, such as manufacturers of aluminium cans for the beverage industry or airline manufacturers which make fuselages, wings and structures out of lightweight aluminium, but we chose Fjellstrand – after all this is shipping at speeds rather alien to the bulk carrier industry.

Asbjørn Tolo is the President of Fjellstrand: "Most of the aluminium profiles in our vessels are produced in Norway, but the aluminium plates are produced in Switzerland and France. Of course, aluminium will not corrode in seawater, and other metals, such as magnesium and manganese, have been added to make an alloy especially fit for purpose. "We need aluminium of a quality that will last for years in our vessels, but also one which we can weld and shape as needed for our ship designs. A catamaran high speed vessel will be subject to structural stress throughout its operational life. Another great advantage of building ships in aluminium is that the material can be recycled after use."

Fjellstrand started out building lifeboats in aluminium, and then went on to build small aluminium yachts for the US market before manufacturing the high speed catamaran ferries sold globally. Today, the yard also produces accommodation units for offshore vessels and Ro/Ro ferries for short sea shipping. One noticeable vessel is the Stavanger, which has podded propulsion (looks pretty much like the underwater housing of speed boats) that can be rotated in any direction. The captain and officers also just rotate the whole bridge when they change the direction of the vessel, which runs in both directions – there is a stern at both ends.

Future plans include high tech, aluminium-built mega yachts for the global market. "We are very well positioned to go into that market segment," says Tolo, adding that the yard has teamed up with one of the world's leading designers of such vessels. The yard is now constructing a new factory hall to facilitate a higher order volume and build more of the bigger ships indoors. The weather on the Norwegian west coast can be rather rainy for much of the year.

A typical Fjellstrand vessel is the JumboCat 60, a car and passenger high speed catamaran constructed for carrying between 450 and 600 passengers. It can carry up to 60 cars, and its door height can accommodate any truck or bus. The operational speed for this type of vessel is 38 knots (70 km/h), and the Fjellstrand production line also includes the FlyingCat 52, which was introduced in 1998, the FlyingCat 46, and the bestseller, the FlyingCat 40. This is the successor of the by far most popular high speed ferry ever made, the 40m FlyingCat. The FlyingCat 40 is a reliable workhorse operating for global customers at speeds of 32–36 knots. The two waterjets are powered by two high-rated diesel engines. Fjellstrand has also invented its own Motion Dampening System (MDS), an active fin located under each bow as well as active fins at the stern to counteract motions. The MDS is hydraulic, computer-controlled, and allows the vessels to keep a higher speed in bad weather too.

For the bulk carrier industry, aluminium is not an option for ship hulls. We hope you have gathered insights into quite another area of shipping – when, in a couple of years, you order your mega-yacht, you know where to call to have a unique vessel built to Norwegian shipping traditions.

For more information, please visit www.fjellstrand.no

DNV and CCS join forces on coatings: Establish joint Technology Institute

The joint venture agreement named 'CCS & DNV Technology Institute' was recently signed by China Classification Society (CCS) and DNV.

The institute which is to be established in Shanghai aims to support both the maritime and offshore industry on various laboratory and research challenges, initially related to coating.

The joint venture agreement, signed by Mr Li Kejun, Chairman and President of CCS, and Mr Henrik O. Madsen, President and CEO of DNV, aims to support the rapid development of the Chinese shipping and offshore industry. Mr Xu Zuyuan, Vice Minister of Ministry of Communications of PRC and H.E. Mrs Chen Naiqing, PRC Ambassador to Norway, were also present at the signing ceremony.

The agreement includes the setting up of a Technology Institute in Shanghai.

Mr Li Kejun commented: "DNV and CCS both focus on quality and safety and regard them as our social responsibility. This is the right time for the two parties to set up this joint venture. DNV and CCS complement each other and this cooperation will definitely enhance the development of Chinese shipbuilding and shipping industry and will further contribute to the world maritime industry."

Mr Henrik O. Madsen added: "We are delighted to establish this joint venture with CCS today. We have a long, proven cooperation based on trust and respect and we firmly believe that with strong support from both parties, this joint venture will benefit the Chinese maritime and offshore industries, thereby strengthening the global maritime and energy markets."

The joint venture agreement between CCS and DNV was signed by Mr Li Kejun, Chairman and President of CCS, and Mr Henrik O. Madsen, President and CEO of DNV. Far left, H.E. Mrs Chen Naiqing, PRC ambassador to Norway. Far right, Mr Xu Zuyan, Vice Minister of Ministry of Communications of PRC.

The Technology Institute will be the first of its kind in China and initially focus on coating and corrosion services. The institute will perform tests according to international standards, in particular the new IMO performance standard for protective coatings.

Areas of cooperation will also include laboratory facilities, expertise and services related to materials, welding, fuel and lub oil analysis.

Corporate agreement signed by DNV and Vietnam Register

Hanoi, Vietnam: DNV and Vietnam Register (VR) have recently signed a corporate agreement to strengthen both positions in the growing Vietnam market.

The agreement was signed at a ceremony in Hanoi by Tor E. Svensen, COO DNV Maritime and Nguyen Van Ban, General Director of Vietnam Register. The long standing relations between the two societies have then been extended and strengthened.

The agreement outlines a co-operation in training and work sharing for single and dual classed vessels within newbuilding, ships-in-operation and certification of materials and components for the shipping industry within Vietnam.

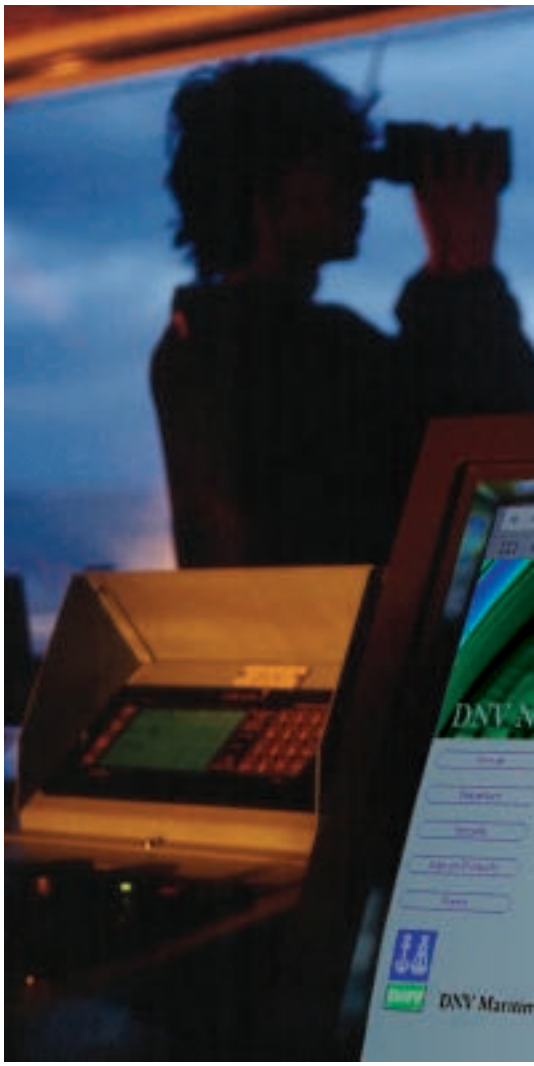
The Vietnam shipping industry is developing rapidly at moment. Stated ambitions are to become a nation having a shipbuilding industry with a technological level equal to that in other regional nations. Accordingly, the localisation rate of domestically made products will rise to 60–70 per cent of the products, effectively serving the plan to promote export and create good conditions for other industries of the nation to develop, according to Vinashin's shipbuilding strategy.

DNV is now the leading foreign class society in Vietnam, with over 70 per cent of the current newbuilding orders placed in the Vietnamese yards. These orders include bulk carriers, car carriers and tankers for international and domestic owners.

"Signing the agreement between DNV and VR is seen by both class societies as a necessary and important step in meeting the continued rapid and extensive growth of the Vietnamese shipbuilding industry," says Tor E. Svensen.

One step ahead in port clearance

Speed, laytime in port and control of risks are familiar success factors in the container ship business. DNV Navigator is an electronic tool which reduces paperwork, time in port and delays due to red tape and rigorous regulations. It is a comprehensive information system and reporting tool.



Information at your fingertips

Every week, DNV Navigator is updated by emails with information related to governing regulations and requirements. The information is taken from sources such as the 'List of Radio Signals' and 'Notices to Mariners' from the UK Hydrographic Office, Fairplay, the IMO, and national publications. The information is structured particularly for the purpose of port clearance and sailing in regulated waters.

As stated by Captain Taraldsen of Teekay Maritime Services: "By using DNV Navigator, we are able to reduce reporting time from hours to minutes. Port clearance goes much more smoothly now."

By masters – for masters

The idea behind DNV Navigator is that the workload of the master and the bridge team can be significantly reduced if the information which has to be kept and maintained on board is digital, structured for its particular purpose and updated automatically by an information service provider.

DNV has established a separate company dedicated to providing such services to the maritime industry. "So far this has been a success," says Peik Jenssen, managing director of DNV Maritime Partner AS. Close to 1,000 ships now use the system and every month new ships take it on board. The ship does not need to be classed by DNV.

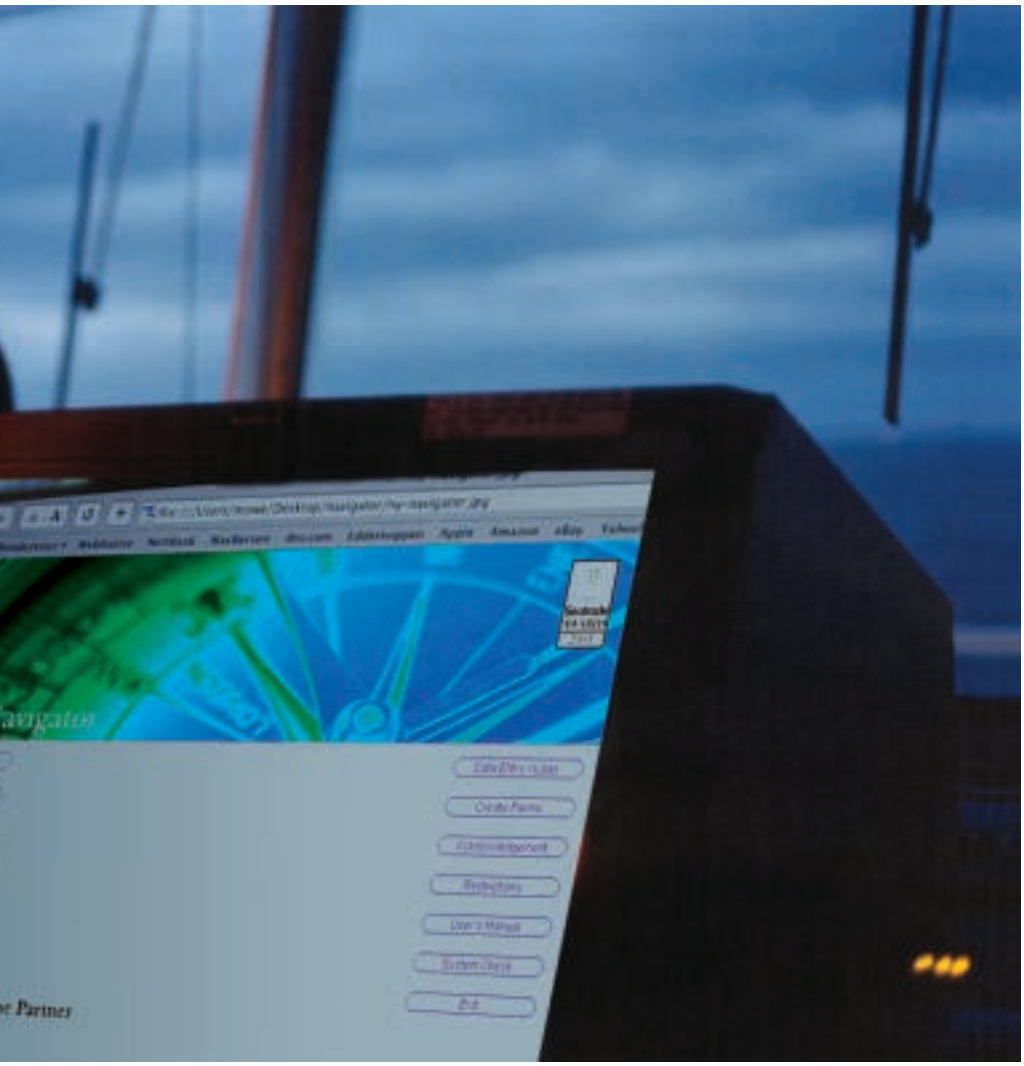
Digital integration

Says Peik Jenssen, "The threshold for using the system is low. It can easily be installed by the user himself and taken into use right away. We can even provide server solutions with unattended installation. And the system can easily share data with other systems. Why should the crew data, for example, be entered twice when it is easy to make an electronic bridge between DNV Navigator and the crewing system?

"Every piece of information should only be entered once and thereafter automatically or semi-automatically reused in other systems. This can be solved by commonly available technologies applied in DNV Navigator."

Electronic reporting

The system includes electronic reporting to the US (eNOAD) and Singapore and is being prepared for similar regimes in other countries. DNV is currently undertaking a project with amongst others the Norwegian Coastal Administration to develop an electronic reporting system in Norway. DNV Navigator contains information for port calls and sailing in regulated waters:



DNV Navigator is an electronic tool which reduces paper work, time in port and delays due to red tape and rigorous regulations.

- Checklists unique to each and every port and regulated fairway
- Information about regulations and requirements
- Information about countries, ports and terminals
- Contact points such as radio signals, phone numbers and addresses
- VTS diagrams and port maps

Furthermore the system contains a rich collection of forms for port clearance purposes as well as forms which are made for use on board and for communication with the operator. There is also room for company-specific forms.

Add-on products

Fleet

DNV Navigator contains a lot of vessel-specific information. Often at least part of this information is needed by the operator. And vice versa, the operator would like to submit information which is to be used in DNV Navigator on board the vessel. DNV Navigator – Fleet is an extension of the vessel version and enables an effective exchange of data between ship and shore.

Examples of such information are:

- Ballast water log and history
- Crew list
- Master's Notes
- People on board
- Status of certificates
- Waste log
- Work & rest hours

Passage Planner

This is a separate product which makes it easy to produce a passage plan as required by Port State Authorities and oil majors. The Passage Planner imports information from DNV Navigator and calculates squat and distances by means of a way point editor.

Today's paperwork – a safety threat

The amount of paperwork to be carried out by the master and bridge team is approaching the limit and has to be done on top of their other normal duties. The demand for reporting is constantly growing and has become a burden which takes time and attention away from effective and safe operations.

Studies carried out by among others DNV indicate that safety at sea is being compromised because officers on merchant ships do not get enough rest periods. This is one important reason why DNV launched DNV Navigator in 2003.

Sulphur solutions can create problems

Ronald Oyer, DNV Petroleum Services.

Today's environmental regulations present many challenges to vessels, especially those equipped with two-stroke diesel engines.

To burn regulation-compliant low sulphur marine fuels while maintaining optimum lubrication, acceptable cylinder wear rates and power component cleanliness, we must understand the impact of fuel sulphur on the development and maintenance of a well-conditioned cylinder running surface.

Sulphur in marine fuels, while environmentally objectionable, serves to etch the surface of the cylinder liner chemically when the fuel is burned at a properly proportioned rate and in a mechanically sound engine.

This etching provides minute porosity in the liner surface, a characteristic essential for proper lubrication and sealing.

The extent of the etching is controlled by a balanced relationship between the lubricant's alkalinity, measured by Base Number or BN, and the sulphur content of the fuel being consumed.

Ships with two-stroke engines tend to find cylinder lubricants with 70 BN adequate when burning relatively high sulphur fuels (3–5 per cent). Their engines experience an acceptable level of acidity for controlled corrosion – etching – as well as depletion of the additive package, which reduces the build-up of harmful deposits.

The arrival of low sulphur fuels, generally regarded as bunkers with less than 1.5 per cent sulphur content, has added a new factor to the equation.

Studies have shown that extended periods of operation on such fuels, coupled with traditional 70 BN cylinder lubricants, may cause the controlled corrosion to diminish and deposits to accumulate in the ring pack areas as well as on the piston crown.

Hard deposits on the piston crown cause increased wear and scuffing of the cylinder liner, while ring groove deposits restrict movement of the piston rings.

A quick fix appears to be in reducing the cylinder oil rate based on the sulphur content of the fuel. This procedure seems to have merit, but it opens the door to a very subjective application of theory.

On the other hand, with the advent of sulphur oxide emission control areas, lubricant manufacturers have stepped up to the plate with lubes in the 40–50 BN range, viewed by some as relief in the form of a 'mechanic in a can'.

Discussions on fleet-wide operations on distillate fuels will pose yet another challenge to engine builders and lube suppliers alike.

Shifting to distillates is not as simple as it seems, particularly in plants employing large two-stroke engines. We have to investigate the effects of long-term distillate use on cylinder running conditions.

With this in mind, changes in lubricant characteristics, cylinder liner and ring pack metallurgy and surface profile may be required.

An old cliché among ship engineers is that "the fun begins at 50,000 hours". This refers to the average life of a well run in and maintained cylinder liner and the resulting replacement work involved.

Many cylinder liners see a life far below – and some way above – the 50,000-hour average.

Experts agree that cylinder conditions and the overall combustion space characteristics of a two-stroke engine over its lifetime are determined by the initial running in of the power system components such as pistons, rings and cylinder liners.

That said, a conscientious plan of initial inspections, adjustments to cylinder oil rates and follow-up inspections, as well as further adjustments, often leads to a plant delivering maximum availability with minimum downtime. Four-stroke plants, while not faced with the complexities of independent cylinder lubrication, must still deal with fuel sulphur and its impact on cylinder condition as well as corrosive effects on other areas of the engine, for example bearings and their respective journals.

While ring pack accumulations are not common due to the flushing effects of splash lubrication, close lubricant condition monitoring should be conducted to

A balance is needed between compliance and engine longevity, writes Ronald Oyer

DNV Petroleum Services lab analyst running Base Number analysis on cylinder lubricating oil.

assess the suitability for continued use, particularly when burning fuels with elevated sulphur levels.

How do we attain the balance that ensures environmental compliance and component longevity required for profitable operations?

To make informed decisions on burning low sulphur fuels we must have first-hand knowledge of the physical and chemical characteristics of the fuel as bunkered.

This is achieved through conscientious fuel procurement, followed by timely analysis based on internationally recognised standards such as ISO 8217:2005. Such analysis yields a number of quality indications, including sulphur content and the presence of abrasive contaminants in the fuel.

While abrasives in marine fuels have always been a prime concern, it becomes more so in two-stroke plants running on low sulphur fuel and high BN cylinder oils at reduced feed rates. This applies to operation for brief as well as extended periods.

In this regard, DNV Petroleum Services encourages all operators to work closely with their respective engine manufacturers, including subscribing to service bulletins and taking advantage of factory-sponsored training.

The websites of many prime engine builders also contain up-to-date service and environmentally sensitive information.

In all instances ship operators should follow the recommendations of their engine builders strictly for low sulphur fuel operation.

Developments in cylinder lubricators, including placement of injection points and feed rate based on engine load, go a long way towards easier calculations and adjustments of lube oil feed rates.

Yet, nothing to date can replace the factual indications obtained by visually examining the cylinder running surfaces, ring pack areas and scavenge spaces.

Above all, we can never over-emphasise the importance of proper fuel injection and combustion, especially when faced with reduced lube oil feed rates.

The same preface applies to lubricant and fuel treatment plant manufacturers.

Armed with the knowledge of fuel characteristics, reliable decisions on lubricant selection and fuel treatment plans will significantly ease the concerns of low sulphur fuel operation.

From the shoreside operations, until supplies of both low sulphur fuels and compatible lubricants are stabilised, ship operators should pay more attention to voyage planning and bunkering to ease the burden on the ship staff.

They should never lose sight of their vessels' limitations in terms of multigrade fuel and lube use.

As shipping is a complex endeavour, and considering the possible consequences of fuel-related problems, involving more parties in the fuel and lube equation may see some traditionally price-driven factors viewed differently.

The entire ship management team and operating staff should work towards a well defined system of total fuel management from conceptual design, delivery and subsequent operations.

Be it two-stroke or four, a well-commissioned and properly maintained plant under the care of trained and knowledgeable staff can deal effectively with issues related to low sulphur fuels.

Finally, as increasing numbers of jurisdictions reach out to develop low sulphur legislation, fine-tuning individual plants for safe, reliable and profitable operation on low sulphur fuels will also require the full co-operation of all concerned.

Ronald Oyer is technical adviser with DNV Petroleum Services' Houston office.
Email: Ronald.Oyer@dnvps.com

For information on marine fuel management solutions: singapore@dnvps.com

First DNV scholarship in China

The first DNV scholarship in China was recently awarded at Harbin Engineering University (HEU). Four undergraduate students majoring in naval architecture and marine engineering, and two postgraduate students majoring in naval architecture have won the DNV scholarship for 2006.

Bjørn K. Haugland, DNV Regional Manager for Greater China and Mr Gao Wanxin, Vice President of HEU attended the DNV Scholarship Award Ceremony held at HEU.

"It's my pleasure to be present and award the first ever scholarship of DNV in China," said Mr Haugland at the ceremony. "Talented people are key to the development of the maritime industry. We're pleased to cooperate with HEU, the cradle of Chinese shipbuilding engineers, partnering on China's path to the largest shipbuilding nation by 2015."

Mr Gao said, "We're glad to welcome the first class society to establish a scholarship at HEU. This cooperation will help train excellent professionals for the shipbuilding industry, and raise the shipbuilding standards of China at-the end.

The ceremony was attended by about fifty students and teachers from HEU. HEU is China's premier comprehensive international university. The College of Shipbuilding Engineering is ranked as the top leading institution of the country.

The scholarship agreement was signed between DNV and HEU in October 2006. As per the agreement, DNV will sponsor scholarships to outstanding undergraduates and postgraduates of HEU over the next five years. This is the first time DNV has established a scholarship in China. Globally, DNV has for some years cooperated with the world's key universities such as MIT, Stanford, and NTNU (Norwegian University of Science and Technology).

Mr Bjørn K. Haugland says "we're pleased to cooperate with HEU, the cradle of the Chinese shipbuilding engineers, partnering on China's path to be the largest shipbuilding nation by 2015." Here congratulating the winners with Mr Gao Wanxin.

Increasing incidence of serious accidents

Stamford, Connecticut, USA: The accident frequency in shipping has decreased over the past few decades. However, although the figures today are half of what they were in the late 1980s, this trend is about to turn.

DNV monitors the annual frequency of serious accidents in several ship segments. Over the past five years, figures from this monitoring show an increasing incidence of serious accidents in several shipping segments. Even the tanker segment, with its high focus on safety, has more reported accidents today than it did five years ago.

Says Dr Espen Cramer, the head of DNV Maritime Solutions: "It is well known that ships and shipping companies are today inspected and audited with increasing intensity. Both the technical standard and transparency are better today than it was years back. In spite of this, we are seeing that the numbers are going in the wrong direction."

DNV's worry is that there is more stress and fatigue relating to the people and organisations both on board and on shore. The shipping industry is booming these days. There is huge growth in almost every segment and the net annual growth in demand for crew is enormous. At the same time, the shipping industry has to fight against loss of manpower to other industries and a short supply of quality crew from international training providers.

LNG technology briefing

The energy industry, shipbuilders and shipping lines will face a host of decisions about the adoption of LNG technologies.

There is a quest for better and more efficient solutions for all parts of the LNG chain. Larger and more effective liquefaction plants are being planned; larger ships with efficient propulsion plants and minimised boil off with on board reliquefaction are being built; novel containment systems that challenge the traditional systems are being proposed; and new receiving terminals based on innovative technology are being developed.

Fatigue considerations and tank sloshing loads are becoming important design parameters. The need for seaborne LNG transportation is increasing rapidly, leading to a doubling of the fleet in just one decade. The consumption of natural gas is projected to increase by nearly 70 per cent between 2002 and 2025.

Offshore receiving/storage terminals and regasification and discharge terminals will in some parts of the world be the preferred future option due to safety considerations and environmental concerns. Floating units for receiving, storage, regasification and export of natural gas (LNG FSRU) as well as units for offshore production (FPSO) are emerging markets. For these new applications, safe operation with partial tank fillings has to be carefully studied on a case-by-case basis.

Sloshing has been a concern from the start. And with larger carriers, terminals and ships operating with partially filled tanks it becomes even more relevant. DNV has a long history of sloshing model experiments, and the past several years have been a logical extension of that development work.

Practical experiments are still favoured over computer simulations.

A sloshing impact is characterised by fluid, which hits the tank wall at high velocity. During these impacts gas is entrapped and mixed in the fluid.

DNV recently issued a new LNG sloshing class note for membrane tank systems.

There are three other class notes under development which will be issued in early 2007. One is focusing on the hull and tank support design of membrane tankers, excluding the containment system, the second is focused on sloshing in membrane tanks and the third is focused on the analysis of the hull and tank system of spherical tank LNG carriers.

A specific DNV research programme, called Operation in Cold Climate, has also been set up to develop class services for strengthening and winterization of ships trading in Arctic waters.

As well as slow speed diesel engines several alternative propulsion arrangements are also being discussed and introduced by the industry. A promising option are dual fuel engines, for which the DNV Class Notation Gas Fuelled provides the necessary rules to cover engine room design, gas storage and gas piping.

After four decades, diesel engines with N-BOG reliquefaction plants and dual fuel engines with electric propulsion systems have managed to break the steam turbine dominance in LNG shipping. During the first half of 2006, 90 per cent of LNG carriers ordered were specified with an alternative machinery installation.

Extracts from a DNV white paper written to assist decision makers

Espen Cramer adds: "In sum, the general level of experience on board vessels has been reduced. There are more new recruits, less retention and faster promotion. In addition to these trends, the workload on board with respect to paperwork and inspections has increased while the crew size is stable. The loss of experience is also a stress factor for those on board who continuously have to train new crewmembers."

The DNV statistics show that an area of high concern is navigational accidents such as collisions, stranding and contact damage.

To reverse this trend and reduce accidents, Espen Cramer wants more focus on the crew on board and the management on shore:

"The crew has to be more involved in safety programmes and the management has to demonstrate more commitment to safety. In that respect, shipping still has more to learn from other industries such as offshore and aviation, where there has been an intense focus on human and organisational factors for more than 25 years."

Dr Espen Cramer, the head of DNV Maritime Solutions.

Changes in the rules for Classification of Ships January 2007

The following rule booklets have been amended in January 2007:

Part 1 General Regulations
Chapter 1 General Regulations

Part 3 Hull and Equipment – Main Class
Chapter 1 Hull Structural Design, Ships with Length 100 metres and above
Chapter 2 Hull Structural Design, Ships with Length less than 100 metres
Chapter 3 Hull Equipment and Safety

Part 4 Machinery and Systems – Main Class
Chapter 2 Rotating Machinery, General
Chapter 3 Rotating Machinery, Drivers
Chapter 4 Rotating Machinery, Power Transmission
Chapter 5 Rotating Machinery, Driven Units
Chapter 7 Boilers, Pressure Vessels, Thermal-Oil Installations and Incinerators
Chapter 8 Electrical Installations
Chapter 14 Steering Gear

Part 5 Special Service and Type – Additional Class
Chapter 1 Ships for Navigation in Ice
Chapter 2 Passenger and Dry Cargo Ships
Chapter 4 Chemical Carriers
Chapter 5 Liquefied Gas Carriers
Chapter 6 Fishing Vessels
Chapter 7 Tugs, Supply Vessels and Other Offshore/Harbour Vessels
Chapter 10 Ships for Carriage of Refrigerated Cargoes
Chapter 14 Naval and Naval Support Vessels

Part 6 Special Equipment and Systems – Additional Class
Chapter 1 Miscellaneous Notations
Chapter 3 Periodically Unattended Machinery Space
Chapter 4 Additional Fire Protection (F-AMC)
Chapter 9 Loading Computer Systems (LCS) for Stability and Longitudinal Strength
Chapter 10 Vapour Control Systems
Chapter 12 Environmental Class
Chapter 13 Gas Fuelled Engine Installations
Chapter 16 NAV-O Class Notation

Part 7 Ships in Operation
Chapter 1 Survey Requirements

Part 8 IACS Common Structural Rules
Chapter 1 Common Structural Rules for Double Hull Oil Tankers with Length 150 metres and above

For more details please see:
http://exchange.dnv.com/ExchangeMenu/TaskManager.asp
Click: Rules and regulations, and then: Rule changes.

The following changes may be of special interest:

Class notation NAV-O
Restriction in use of Class notation NAV-O has been removed.

There are a number of vessels being transferred to DNV class that have an additional class notation for nautical safety from the loosing society. As the additional class notations for nautical safety developed by DNV is different due to the basic concept applied it is in many cases not possible to assign the requested additional class notation. In order to cope with this NAV-O was developed and came into force on 1 July 2004, however with the limitation that such ships shall have been constructed before 1 July 2002.

The possibility of offering the NAV-O notation to class entry vessels built after 1 July 2002 is equally important as for older vessels; hence the restriction has been removed.

Class notations PIMS(HULL)
Class notations PIMS(HULL) for inspection and maintenance of hull has been introduced. PIMS-HULL will encourage introduction of owner's hull inspection schemes for primarily tankers and container ships. By implementing the PIMS-HULL the owner will get better control of the structural condition on board their ships and the performance of the system is monitored by class. This is a mean for quality owner to market towards oil majors, cargo owners, liner operators and other stake holders that they are in control of ships hull condition. By introduction of PIMS-HULL DNV will also have access to records from owners/managers hull inspections. This may be used in connection with preparation of periodical hull surveys by DNV.

Rotating Machinery – General
Alignment with IACS UR M3 for speed governing for emergency generator sets including diesel engines has been performed.

Rotating Machinery – Diesel Engines
The design of diesel engine foundations, including such details as thermal expansion and where to fit stoppers, is considered to be the task the diesel engine manufacturer rather than the yard. This also corresponds to actual practice where the yard consults the engine manufacturers. Yards may influence the chocking thickness; however this is of minor significance as long as it is not extreme in any direction compared to bolt pre-stress.

The yard has been responsible for *torsional vibration calculations* (tvc). Normally the engine manufacturers carry out these calculations on behalf of the yards, but sometimes these tasks are outsourced to other sub-suppliers. Such sub-suppliers often use disclaimers that make the analysis invalid, i.e. only accepting responsibility for their own delivery. This is not acceptable to DNV because a tvc shall deal with both calculated vibration levels and the permissible levels for all components in the system. Text corresponding to this issue has been introduced.

Shipboard testing of propulsion engines has been aligned with IACS M51, as appropriate, and to be more in line with reported practice.

Rotating Machinery – Shafting
In 2001 the rules for shafting was thoroughly revised and in 2005 the IACS UR M68 for shafting was implemented in the Rules. Technical corrections and improvements have been implemented in this revision of the rules.

Rotating Machinery – Propellers and Thrusters
Through consultancy services related to damage investigations of propellers, DNV have gained significant knowledge related to the loads and corresponding responses in the pitch mechanism. Further, recent DNV research and development work has resulted in novel calculation technology for analytical strength calculations – both

for propeller blades and pitch mechanism. Combined with experiences from existing calculation practice, improved calculation methods are proposed – additionally presented in detail in a separate proposal to update the CN.41.5.

The limit for not requiring torsional vibration calculations for auxiliary thrusters has been set to 500 kW, as for other auxiliary installations.

Azimuth speed, design criteria has been aligned with actual test criteria.

Boilers, Pressure Vessels, Thermal oil installations and Incinerators

Paragraph regarding ultrasonic testing in lieu of radiographic testing has been added to be in line with practice.

Electrical installations

The rules have been updated to be in line with amended IEC and IACS requirements. Section 7 has in addition been rearranged. Miscellaneous references have been updated and some requirements rearranged for readability. A number of paragraphs have been deleted, as the requirements are covered in other parts of the rules.

New concept of Hazardous Area Zones has been implemented for selection of EX protected electrical equipment.

Ships for navigation in Ice

The rules have been updated by implementation of IACS UR I1, and the Finnish Maritime Authority's (FMA) new definition of the maximum and minimum ice class draughts and marking of ice draught when limited below the maximum 'Summer Fresh water' line.

Liquefied Gas, Oil and Chemical Carriers and Gas Fuelled Engine Installations

The rules have been changed mainly due to adoption of Hazardous Area Zones 0, 1 and 2 instead of Concept of Gas Safe/ Dangerous Zones and Spaces.

55th session of Marine Environment Protection Committee (MEPC), 9–13 October 2006

The International Maritime Organisation's (IMO) MEPC Committee discussed and adopted relevant issues related to protection of the environment. A summary is given below.

The phasing in of ballast water treatment technologies to prevent spread of harmful aquatic organisms remains as is. This means that some vessel shall have in place a type approved ballast water treatment system upon delivery.

The work on the proposed new convention on *recycling* continues, to meet the schedule of adopting the convention by 2008/2009.

Amendments made to mandatory instruments:

- The Southern South African Waters was adopted as a MARPOL Annex I (on Oil) Special Area
- Amendments to Condition Assessment Scheme (CAS) was adopted
- Revised MARPOL Annex III (on Harmful Substances in Packaged Form) was adopted and will enter into force on 1 January 2010
- Amendments to the Guidelines for the transport and handling of hazardous and noxious liquid substances in bulk on offshore support vessels
- Amendments to chapters 17, 18 and 19 of the revised IBC Code
- Interpretation of MARPOL Annex I requirement for *prompt access to computerised shore-based damage stability and residual structural strength calculation programs*
- Interpretation of MARPOL Annex IV (on Sewage) for shore discharge pipeline and the relevant shore connection flange

The Committee is also working on:

- regulations and guidelines related to bilge systems and bilge discharge criteria.
- Review of MARPOL Annex V (on Garbage)

For additional information, see http://exchange.dnv.com > Rules and Regulations

DNV contacts: Eivind.Haugen@dnv.com and Karl.Rygh@dnv.com

New IACS Unified Requirement (UR) for Hull Surveys of New Constructions

The document was published by the International Association of Classification Societies (IACS) and will be implemented by IACS Societies on ships contracted after 1 January 2008. It includes the following main activities:

- Examination of the parts of the ship covered by classification rules and by applicable statutory regulations for hull construction, taking account of the relevant approved drawings.
- Appraisal of the manufacturing, construction, control and qualification procedures, including welding and assemblies, with indication of relevant inspections and approval tests and specifying the items to be examined and or tested and how and by whom.
- Appraisal of material and equipment used and their inspection at works is not included in this UR. These requirements are covered by other URs. These items are surveyed at the manufacturer's works and appropriate certificates are issued.

For additional information, see http://www.iacs.org.uk/ > Publications > Unified Requirements

Sound experience and a good reputation

Captain August Olsen from Halden, Norway, was DNV's surveyor in Liverpool from 1880 to 1903.

DNV's first surveyors were sailing ship captains with sound experience and a good reputation.

In Halden, by that time an important maritime town, DNV hired the 40 year old captain August Olsen in 1875.

The surveyors' decisions were not always popular with the shipowners. It could cost a lot of money to get the ships into a proper state that complied with the regulations, but August Olsen was aware of his responsibilities and made well-informed decisions regarding what had to be done to reduce the risk of accidents and injuries/damage. DNV's management were very pleased with his work and his district was extended to include Fredrikstad.

In 1880, Olsen was stationed for six months at DNV's new station in Liverpool. He was stationed there again in 1885 and stayed for four years.

Liverpool was one of the first places outside Norway in which DNV stationed its surveyors. At that time, Liverpool was one of the world's most important maritime cities and was especially important to the huge volume of shipping between the UK and China. This is where Europe's first Chinatown was established, and Liverpool had a steamship link to the USA every fortnight as far back as in the 1840s.

August Olsen (third from left) and his family in their garden in Liverpool around 1895.

In 1889, DNV offered Olsen a permanent job in Liverpool, and he remained there with his wife and five children until 1903.

We welcome your thoughts!

DNV Maritime News is DNV's marine-focused technical publication. The bi-monthly newsletter is intended to provide readers with DNV views, news and research developments. Editorial content is gathered from senior management and regional offices around the globe.

The newsletter is free of charge and is distributed to DNV customers and industry players worldwide. It may be viewed electronically at www.dnv.com/maritime under 'shortcuts'

DNV Maritime News is produced by DNV Maritime.

Published by DNV Maritime
Editor: Knut.Anders.Andersen@dnv.com

Det Norske Veritas
NO-1322 Høvik, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11

Updated list of all regional offices at DNV's web site www.dnv.com/maritime under 'find us'

Any comments/questions, please call us at DNV Maritime
+47 67 57 99 00

8,500/ 4-2007 Design: Coor Graphic Communications 0703-035 Print: GAN Grafisk