

ClassNK

MAGAZINE 2009

61st
EDITION

Special Article

The Greek Connection

ClassNK expands services to the world's leading shipping nation

Story from the Sea

Environmental Focus

Introducing ClassNK's newest environmental services

Technical Essays

Auriga Leader Mid-Term Report
Building Better Oil Tankers

Focus on Japan

ClassNK Around the World

Topics and Events





A handwritten signature in black ink, which appears to read 'N. Ueda'.

Chairman and President Noboru Ueda

Chairman's Message

Welcome to the 61st edition of the ClassNK Magazine

While it is always a pleasure for me to welcome you to the ClassNK Magazine each year, this year is special in that it marks the 110th anniversary of ClassNK's founding. Anniversaries like this are always a special occasion, especially in the maritime industry with its dramatic swings between booming and busting markets. It makes me all the more proud then that ClassNK has better than just survived for the past 110 years, we have gone from success to success. Since our founding more than a century ago, we have grown to become the world's largest class society on a gross tonnage basis, and we currently remain the only class society to have more than 160 million gross tons on our register. This then is truly an anniversary worthy of celebration.

Looking back at the history of the Society over these 110 years, it is obvious that much has changed, both in the maritime industry as a whole and in our work as a class society. The world economy has grown and become more global, and in turn, ClassNK has worked proactively to expand our service network to better serve the growing number of our clients located around the world. At the same time, our

mission has grown to include not only ensuring the safety of life, property at sea, and the marine environment, but also conducting cutting edge research and working to reduce ship emissions.

I firmly believe that it has been these changes, as well as ClassNK's responses to them, that have been the cornerstone of our unprecedented success. However, there is no doubt in my mind that our success is also due to our dedication to providing our customers with the best technical services available. For more than a century now, this commitment has been the driving force behind the growth and development of our Society. It is the combination of these two essential elements that have made ClassNK the success story it has been over the past 110 years.

In many ways, this year's ClassNK Magazine embodies both the way that ClassNK has responded to the changing nature of the industry, while staying true to our core mission of providing the best technical service to our clients. This year's Technical Essays focus on the cutting edge of maritime science with

articles on NYK's solar panel equipped car carrier and the newest developments in anti-corrosive steel plates, while our Environmental Focus article highlights our newest services for improving ship efficiency and protecting the environment from pollution. On the international front, this year's magazines includes articles on our efforts in Greece, Egypt and Bangladesh, while domestically, we explore the latest news from Nagasaki and Yokohama as they each celebrate milestones of their own. With interesting and informative articles throughout, I believe that this year's Magazine truly lives up to the achievement that our 110th anniversary represents.

Finally, I would like to thank all of our clients around the world for their continued support of ClassNK and our activities. It is thanks to your efforts that we have achieved such great success over the past 110 years, and I promise that ClassNK will continue to provide the very best in service over the many years to come.

Thank you again, and I hope you enjoy this year's edition of the ClassNK Magazine.

Chairman's Message

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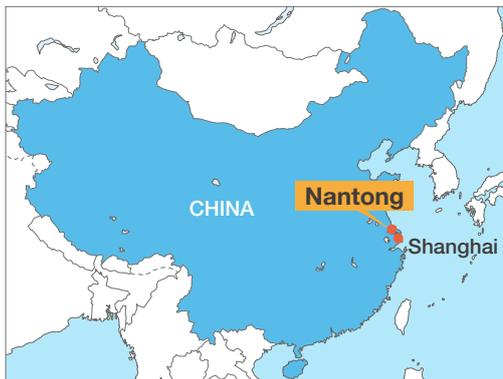
Newly Established Offices



Dammam Local Area Representative Established

A new Local Area Representative (LAR) was established in Dammam, Saudi Arabia under the jurisdiction of the Jeddah Office on 1 March 2009, in order to address the growing demand for surveys in the Persian Gulf.

Dammam is the largest city in the eastern part of Saudi Arabia, and is one of the largest ports on the Persian Gulf. The Port of Dammam is second only to the Port of Jeddah in terms of cargo volumes, and is an important transfer point for oil drilled in the region.



Nantong Office Established

ClassNK established a new office in Nantong, China on 1 April 2009. This office is a new branch office of Nippon Kaiji Kyokai (China) Co., Ltd., the Society's Chinese subsidiary that was incorporated on March 1st, 2009.

Nantong is located in the southern part of Jiangsu Province, bordered by the Yellow Sea to the east, and the Changjiang River to the south. Nantong is well known as an industrial center, with many industries, including maritime transport, growing rapidly over the past several years. The Nantong Office is the seventh exclusive survey office to be established by ClassNK in mainland China.



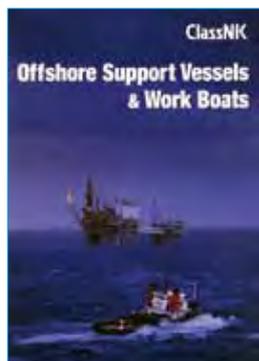
Fujairah Local Area Representative Established

A new Local Area Representative (LAR) was established in Fujairah, UAE under the jurisdiction of the Dubai Office on 1 September 2009. Fujairah is located on the eastern part of the Straits of Hormuz, and is one of the seven emirates which make up the UAE.

The Port of Fujairah is an important port for oil transportation, and the number of tankers calling at the port has steadily increased in recent years. The Fujairah Office is the second exclusive survey office to be established by ClassNK in the UAE and becomes the 106th office in the ClassNK global service network.

Publications

“Offshore Support Vessels & Work Boats” Pamphlet Released

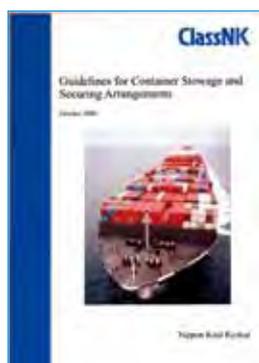


In response to growing interest from owners and operators, ClassNK released a new pamphlet for “Offshore Support Vessels & Work Boats”, which covers ClassNK’s services for tugs, anchor handling vessels, and other work boats, at the end of 2008. The pamphlet showcases a variety of the high performance ships that ClassNK has classified, from offshore

support vessels, to dredgers, cable layers, and even advanced mobile drilling units like the *Chikyu*.

You can view the brochure on the “Free Publications” section of the Society’s website.

“Guidelines for Container Stowage and Securing Arrangements” Published



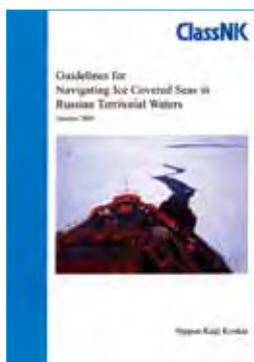
As the volume of containerized cargo increases, container ships are growing ever larger. At the same time, container stowing and securing technology has become more advanced, with a number of different securing and stowing methods now in use. In addition to these changes, a number of recent accidents have occurred as a result of stowage and securing

errors, highlighting the importance of properly stowing and securing cargo to ensure safe ship operations.

In order to address these issues, and prevent cargo shifting and overloading, ClassNK released the new “Guidelines for Container Stowing and Securing Arrangements” in October 2009. This new guideline provides the latest ISO standards for containers, as well as detailed evaluation systems for a wide variety of securing and stowing methods. The guidelines also include calculation examples so that users can quickly

and easily understand how to best evaluate the adequacy of their intended container stowage and securing plans. The guidance is available free-of-charge on the Society’s website.

“Guidelines for Navigating Ice Covered Seas in Russian Territorial Waters” Released



As global demand for energy grows, energy resource development is increasingly occurring in areas that were previously unnavigable. Oil and LNG exploration especially, are occurring in ice bound areas such as Sakhalin and the Arctic Ocean that were previously unreachable by ship. The development and transportation of resources from such

areas presents new technical challenges and demanding construction requirements, especially with regards to hull construction and propulsion systems. Equally, different countries have different requirements for ships operating in their territorial waters, further complicating ship operations in these regions. In order to address this situation and clarify the many different rules and regulations governing ship operations in the region, ClassNK released the new “Guidelines for Navigating Ice Covered Seas in Russian Territorial Waters”. This Guideline provides in depth coverage of measures required for navigation in ice bound waters, as well as procedures for marine navigation in Russian territorial waters.

The Guideline is available free of charge on the Society’s website, and is available in print from the ClassNK Information Service Department.

Exhibitions

Maritime Vietnam 2009



The Maritime Vietnam 2009 exhibition was held from 25 to 27 February 2009 at the Saigon Exhibition & Convention Centre in Ho Chi Minh, Vietnam. This was the first time the Society attended the event, which is the largest marine exhibition

in the southern part of Vietnam. This year, roughly 300 companies exhibited at the exhibition, and more than 4000 people visited the event.

A large number of guests visited the ClassNK stand, including representatives from such companies as Vinalines and PetroVietnam. ClassNK Haiphong Office General Manager Ogahara also served as a panelist on the "Focus on Vietnam's Shipbuilding, Ship Repair & Conversion Industry" panel held on the first day of the event.

Europort Istanbul 2009



The Europort Istanbul 2009 exhibition was held from 25 to 28 March 2009 in Istanbul, Turkey. This was the first time the Society attended the event which is held at the Istanbul Expo Center every other year. Roughly 200 companies, including

Turkish shipbuilders, shipping companies, and equipment manufacturers, as well as a number of Dutch, Romanian, and Korean companies, participated as exhibitors. ClassNK Chairman and President Ueda and Istanbul Office General Manager K.O. Karakoc, along with many members of the Istanbul Office staff attended the Society's booth during the event. More than 500 guests visited the NK booth during the course of the exhibition, including representatives from Turkey's leading maritime companies, such as Akmar Holdings, Yasa Tanker, and others.

CMA Shipping 2009



This year marked the fourth year that ClassNK participated in CMA Shipping 2009, which was held from 23 to 26 March at the Hilton Stamford Hotel in Stamford Connecticut, U.S.A., under the sponsorship of the Connecticut Maritime Association (CMA).

ClassNK North America Regional Manager T. Shiot-suki, as well as many staff members from ClassNK New York Office attended the booth and helped introduce NK's activities, current status and technical capabilities to the many guests who attended the event. The ClassNK booth's excellent location and eye-catching design helped draw more than 150 visitors, including shipowners, equipment manufacturers, and government officials.

Sea Asia 2009



The Sea Asia 2009 exhibition was held from 21 to 23 April 2009 in Singapore. This was the second time the Society attended the event, which is held at Suntec Singapore every other year. More than 300 companies, including Singaporean ship-

builders, shipping companies, and equipment manufacturers participated as exhibitors. The ClassNK booth was established in an excellent location facing the exhibition's main thoroughfare, and the booth's excellent design helped draw a large number of visitors. In addition to staff from the Head Office and the Singapore Office who attended the Society's booth, ClassNK Managing Director F. Imakita also attended the event, clearly demonstrating NK's commitment to the event and the local maritime industry.

ShipTek 2009



Just a few weeks after Sea Asia 2009, ClassNK participated in the ShipTek 2009 exhibition at the Singapore EXPO exhibition hall on 6 and 7 May 2009. ShipTek is an international exhibition that is held in a different location every year. Chair-

man and President Ueda gave the opening greetings at the international conference that was held concurrently with the exhibition, and NK London Office Manager Dr. Rahim gave a presentation entitled “Hydroelastic response due to Springing of Mega-Container Ships - An Experimental Study”.

Roughly 40 companies, including manufacturers, international organizations, media, and education organizations set up stands at the exhibition. The event was extremely successful, and the Society introduced its activities and research and development projects to more than 250 visitors, in addition to the large number of conference attendees.

Nor-Shipping 2009



The Nor-Shipping 2009 exhibition was held from 9 to 12 June at Norges Varemesse in Lillestrom, Norway. As with the previous event held in 2007, the Society once again set up a booth at the exhibition, which is one of the largest maritime

exhibitions in the world. A total of some 1,100 exhibitors from 52 countries attended the event this year, representing a wide range of owners, manufactures, shipbuilders, class societies and press from around the world.

In addition to greeting a large number of visitors during the exhibition, Chairman and President Ueda and many members of the Oslo Office and Head Office staff proactively worked to strengthen client relationships by attending a number of events held in coordination with Nor-Shipping 2009, including parties held by the Japanese, Korean, and Singaporean national delegations.

INMEX India 2009



ClassNK also attended the INMEX India 2009 exhibition held on 24 to 26 September at Bombay Exhibition Centre in Mumbai.

This year marked the sixth time that the exhibition has been held, but it was the first time that ClassNK

established a stand at the event. A total of some 450 companies, mainly shipbuilding companies and ship equipment manufacturers in India attended the event. NK was the only class society to exhibit at the event, and a large number of visitors stopped by the NK booth over the three days the event was held.

COPINAVAL 2009



COPINAVAL 2009 was held on 18 to 22 October in Montevideo, Uruguay. COPINAVAL, which is held on a rotating basis every two years, is the largest maritime related academic conference held in South America This was the first

time that NK attended an exhibition/conference in South America, and in honor of the occasion, Chairman and President N. Ueda, Buenos Aires Office General Manager N. Grimaldi, and several office staff from both Argentina and Japan attended the event from ClassNK. During the conference, Research Manager Usami gave a presentation on “ClassNK’s Activities on LNG Carriers”. With many LNG and energy development projects being started in South America, the topic was of great interest to the attendees, and there was a lively Q&A session following the presentation.

ClassNK Academy

With labor shortages, ageing workforces, and technology and regulations that grow more complex each day, maritime companies are increasingly turning to outside help to provide educational and training programs for new employees. It should be no surprise then that many companies have called upon ClassNK, with its thorough knowledge of maritime regulations, cutting-edge research, and more than a century of experience in ship classification, to provide such programs and services. In order to respond to the growing number of requests for these programs, ClassNK unveiled the new ClassNK Academy in June 2009.

The ClassNK Academy is an educational program designed to provide newcomers to the maritime industry with a working knowledge of shipping and shipbuilding, with a specific focus on surveys and other inspections. ClassNK is currently offering a total of seven courses, focused on both newbuildings and ships in service. Academy courses use educational materials created specifically for the ClassNK Academy program, and all courses are taught by veteran NK surveyors and technical staff.

In 2009 ClassNK offered the ClassNK Academy program at five locations within Japan, including Tokyo, Kobe, Hiroshima, Imabari, and Saeki. The Academy has met with great success so far, and in order to better support the world maritime industry, ClassNK will begin offering the Academy program outside of Japan in 2010.

The contents of each course are shown at right.



Classification Society and Statutory Issue Course

Designed to give participants a general understanding of classification societies and their work, this course covers the history of ship classification, and provides background on international treaties and conventions, as well as class rules and surveys.

- History and role of classification societies
- Summary of major international maritime conventions (SOLAS, MARPOL, ICLL, safe navigation (COLREG), tonnage, ballast water, etc.)
- Summary of classification surveys and statutory surveys

New Shipbuilding Course (Hull, Machinery and Electrical Installations)

This course provides an overview of the newbuilding process, as well as covering the latest in newbuilding technology. The course will also give participants a basic understanding of the classification survey system and how to prepare for newbuilding surveys effectively.

- Recent developments in new shipbuilding technology
- New shipbuilding and the classification survey system
- Key points for undergoing surveys effectively

Materials and Welding Course

This course introduces various aspects of welding and the ClassNK rules for shipbuilding materials. The course also covers material inspections and the class approval process.

- Vertical inspections for ensuring the quality of hull welds
- Basic knowledge about welding and NK rules on materials, welding, and non-destructive testing (NDT)
- Manufacturing process of steels
- Actual application of advanced steels
- Review of ClassNK's Guidelines on the Application of YP47 Steel for Hull Structures of Large Container Carriers

Damage and Maintenance Course (Hull, Machinery and Electrical Installations)

This course not only examines the most common locations and types of damage, but also to how prevent damage before it occurs. The course also provides participants with checklists and routines for daily maintenance and covers maintenance techniques for the hull, machinery and electrical installations.

- Up to date damage statistics
- Examples of damage and their causes
- Methods for preventing and repairing damage
- Check lists for daily maintenance

Safety Equipment Course

This course introduces the rules and regulations for safety equipment (rescue, fire fighting, etc) aboard ships. The course also covers inspection requirements for ships in service, as well as provides maintenance and inspection advice.

- Construction requirements for safety equipment required by SOLAS
- Main inspection checkpoints for the safety equipment of ships in service
- Regular maintenance tools and inspection advice for safety equipment

Cargo Handling Appliances Course

This course provides a basic understanding of the cargo handling appliances found on ships. The course focuses on not only the construction and operation of the appliances, but also their testing, inspection, and certification.

- Types of cargo handling appliances
- Construction and operation of cargo handling appliances
- Testing, inspection, and certification of cargo handling appliances
- Flag and port administration requirements



Port State Control (PSC)

This course provides a basic understanding of how Port State Control operates, and will give participants background on the latest PSC initiatives, as well as advice on how to prevent PSC detentions.

- Latest PSC trends and News
- Revisions and amendments to PSC laws and regulation
- Introduction to detention procedures and ways to reduce PSC detentions

Auriga Leader Mid-Term Report

Evaluating NYK's new solar panel equipped car carrier

Motoo Maru

NYK Line, Technical Group, Ship Technology Team



In April of 2008, NYK Line President Koji Miyahara launched a Special Environmental Project, called the NYK Cool Earth Project, in order to promote more environmentally friendly approaches to the shipping industry. This project, which operates under the direct control of the President, has greatly accelerated the progress of NYK's environmental initiatives. One early result of this new project is the *Auriga Leader*, a 60,000 gt solar panel equipped car carrier that was delivered in December 2008. This report introduces the results of the *Auriga Leader*'s demonstration tests, which took place over a seven month period following the ship's delivery.

NYK and Environmental Awareness

Thanks to their ability to carry large amounts of cargo, ships are more environmentally friendly than other types of cargo transportation. However, due to growing cargo volumes around the world, CO₂ emissions from the international shipping industry continue to increase. Along with the safe operation of its ships, NYK has made preserving the environment one of its top operational priorities for a number of years and has begun a variety of initiatives and projects to achieve these objectives. In 2005, for example, NYK Line began a company-wide "Save Bunker Campaign" in an effort to reduce fuel consumption and CO₂ emissions. However, according

to a report issued by the International Maritime Organization (IMO), CO₂ emissions from shipping reached 840 million tons in 2007, roughly 3% of the total world emissions that year. In light of this situation, NYK Line felt that more aggressive steps needed to be taken to protect the environment, and in April 2008, the company launched a new Special Environmental Project called the NYK Cool Earth Project.

In addition to NYK's other ongoing environmental activities, the Special Environmental Project aims to develop environmentally friendly initiatives in an even wider variety of transportation related fields. The NYK Cool Earth Project, for example, will specifically focus on environmental engineering, the development and application of energy saving equipment, and the use of wind, solar and other renewable energy sources. As part of this project, NYK and the Nippon Oil Corporation jointly developed the car carrier *Auriga Leader*, the first ship in the world to use solar power to provide part of the energy required for ship propulsion.

The Solar Power Equipment on the *Auriga Leader*

As part of a two-year test to demonstrate the viability of using solar energy to power ship propulsion, a total of 328 large solar panels capable of producing 40 kW, as well as electrical generating equipment, were installed on the *Auriga Leader*. Previously, only low capacity 100V solar power generation equipment capable of powering the lights in dining spaces had been installed aboard ships. However, in order to use solar energy as part of the power supply for ship propulsion, larger scale power generation systems are necessary. For this reason, the *Auriga Leader* makes use of a large solar power generating system capable of being connected to the 440V system used in large merchant ships. (Fig. 1)

Difficulties Related to Shipboard Installation

Unlike the roof of a house, the deck of a ship is a work space that crew members frequently traverse, and it is relatively easy for the crew to approach and come in

contact with the solar panels. Consequently, if electricity were to leak from the panels or generating equipment, it could expose crewmembers to high voltage electricity and life threatening electric shocks. As a result, insulation and detection equipment must be installed, and to prevent potential accidents, it is necessary to install additional countermeasure that are not needed in shore-based systems. To address this problem, NYK developed a system to continuously monitor and regulate insulation levels at two separate points along the circuit. This is a completely new, patent-pending system that was developed specifically for the *Auriga Leader* and is not found in conventional solar power generation systems.

Another difference compared with land-based solar power systems is the constant motion of the ship due to waves and engine vibration. One of the primary objectives of the current demonstration test is to verify whether the solar power system and the solar panels can withstand the constant vibrations, as well the continual repetitive motions of the ship.

Status Report

The *Auriga Leader* was completed and delivered by Mitsubishi Heavy Industries, Ltd. Kobe Shipyard in December 2008. For roughly the next seven months, the *Auriga Leader* was commissioned to sail to the Middle East, the Caribbean, and North America. Over this period the ship encountered a variety of severe weather conditions, including three hours of thunderstorms, twenty hours of strong winds (of roughly 20 m/sec.), and 48 hours of 3-4 m waves. However, the solar power system operated flawlessly throughout this period. Further,

the system generated more power than initially expected, with the total power generation over the seven month period reaching 32,300 Wh. This value is equivalent to the power consumed by about 17 households over the same period. Additionally, the system reduced the amount of CO₂ emitted by the ship over this period by roughly 22 tons. This system is currently expected to reduce annual CO₂ emissions by approximately 40 tons and provide a fuel savings of roughly 13 tons per year.

The ship has also received a considerable amount of interest internationally. For example when the *Auriga Leader* entered the port of Long Beach, California, where environmental awareness is particularly high, the ship received significant media attention and acclaim from port personnel as an environmentally friendly car carrier.

Future Initiatives

The solar power generation system installed on the *Auriga Leader* has a maximum output of 40 kW, however, the actual output can change rapidly and exhibits a great deal of fluctuation. In order to install a larger version of this system onboard in the future, it will be necessary to install systems to smooth out these power fluctuations, as well as to prevent problems that would affect ship operations in the event of a power outage or similar electrical failure. To address these issues, NYK is currently developing the technology to combine solar power generating systems with storage batteries in order to pave the way for the installation of larger systems in the future.

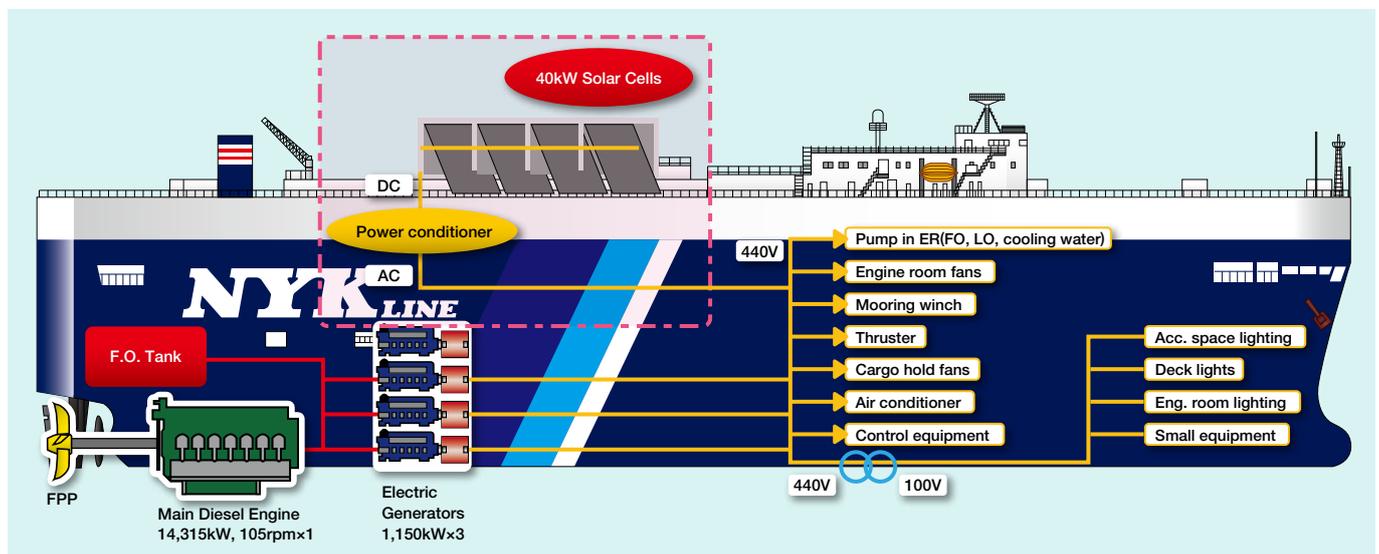


Fig. 1: The *Auriga Leader*'s electrical system

Technical Essays

Building Better Oil Tankers

The development of anti-corrosive steel and its application in oil tanker cargo tanks

Yuuji Funatsu

Senior Manager, Plate Technical Dept., Plate Sales Div., Nippon Steel Corporation

While the negative effects of corrosion in ballast tanks and void spaces have been highly publicized and corrosion in these areas has been well understood for some time, corrosion in the cargo oil tanks of oil tankers did not become an object of serious study until the 1990s. During this period, cargo oil tank corrosion was cited as a contributing factor in the casualties of a number of ageing tankers. However, the development process for corrosion in cargo oil tanks was not well understood at the time. This report discusses the results of research into cargo oil tank corrosion and introduces Nippon Steel's new NSGP-1 anti-corrosive steel plate, a newly developed type of steel designed as a solution to the problem of cargo oil tank corrosion.

In order to address growing concerns over tanker safety, the Japanese government sponsored an investigation into the causes of corrosion in tanker cargo oil tanks from 1999 to 2002. This investigation revealed that the main types of corrosion seen in tankers are pitting corrosion of the oil tank bottom plates and

general corrosion of the underside of the deck plating. As can be seen in Photo 1, pitting corrosion is a small and localized type of corrosion; however, pitting corrosion can progress incredibly rapidly, with rates reaching up to 5mm/year. As owners are required to repair pits deeper than 4mm, pitting corrosion can quickly lead to extensive and costly repairs. Further, as shown in Fig. 1, the pit count inside cargo oil tanks is generally very high, and extensive corrosion can potentially lead to oil leaks. To prevent this type of corrosion, parts are generally coated with a thick coat of epoxy-based paint. Paint, however, is not an effective long-term protection method. Moreover, when paint becomes damaged, corrosion propagates quickly in the damaged area, making more permanent and long lasting solutions a necessity.

In order to understand how to best deal with pitting corrosion, it was first necessary to understand the special corrosive characteristics of the environment inside oil cargo tanks. When a cargo tank is loaded with crude oil,

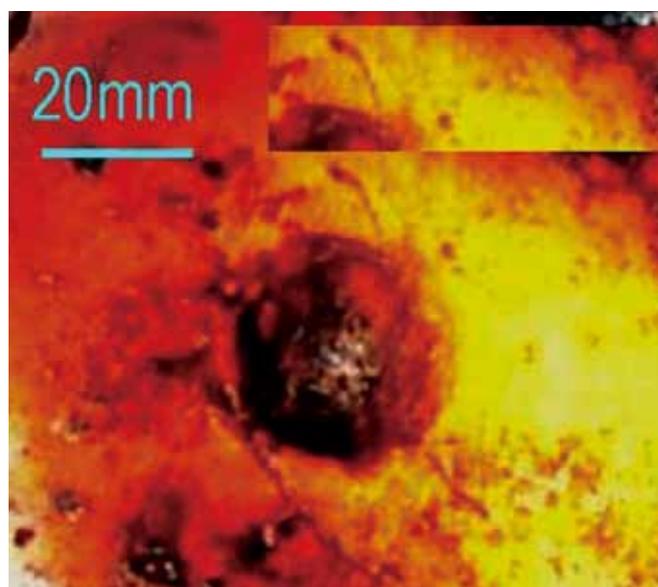


Photo 1: Pitting on a conventional steel plate (uncoated).

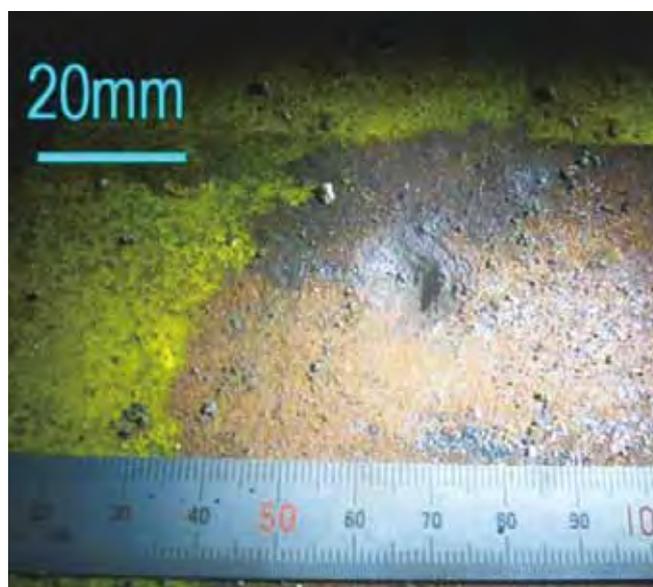
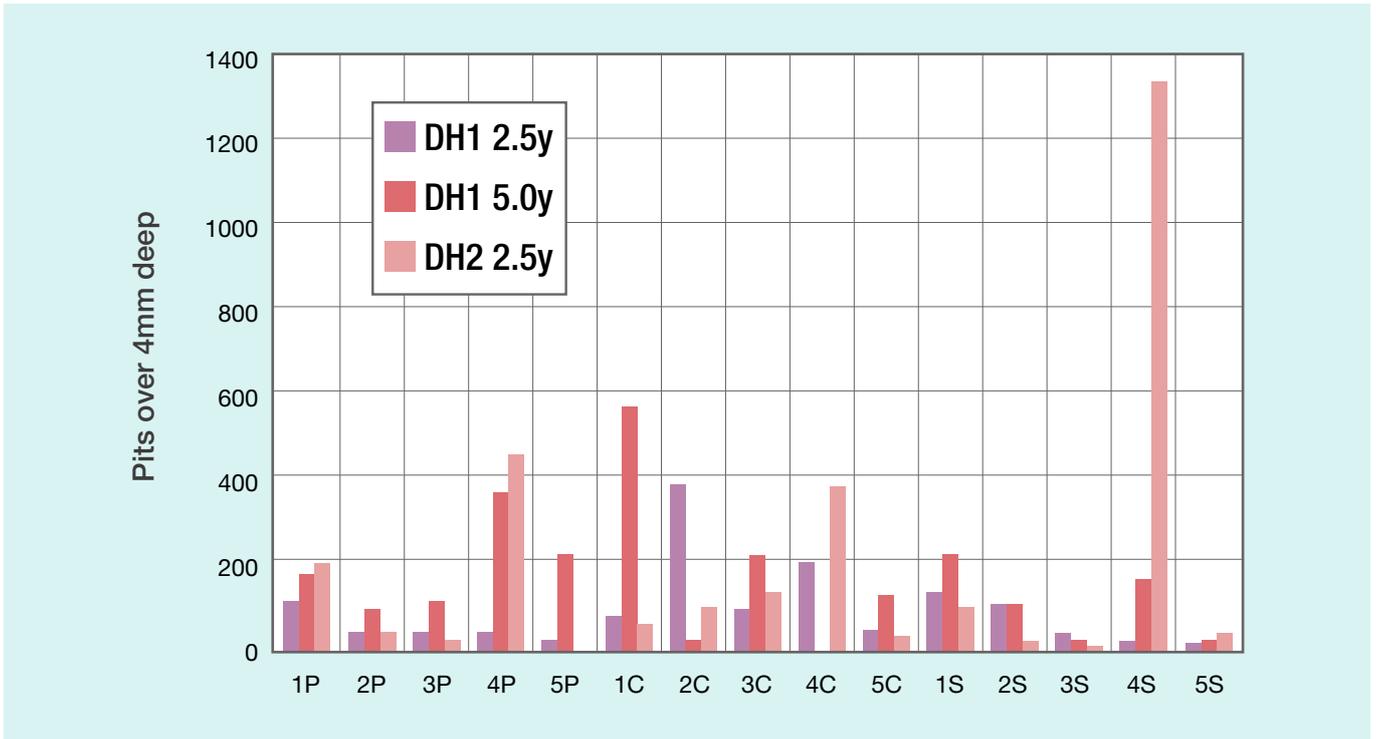


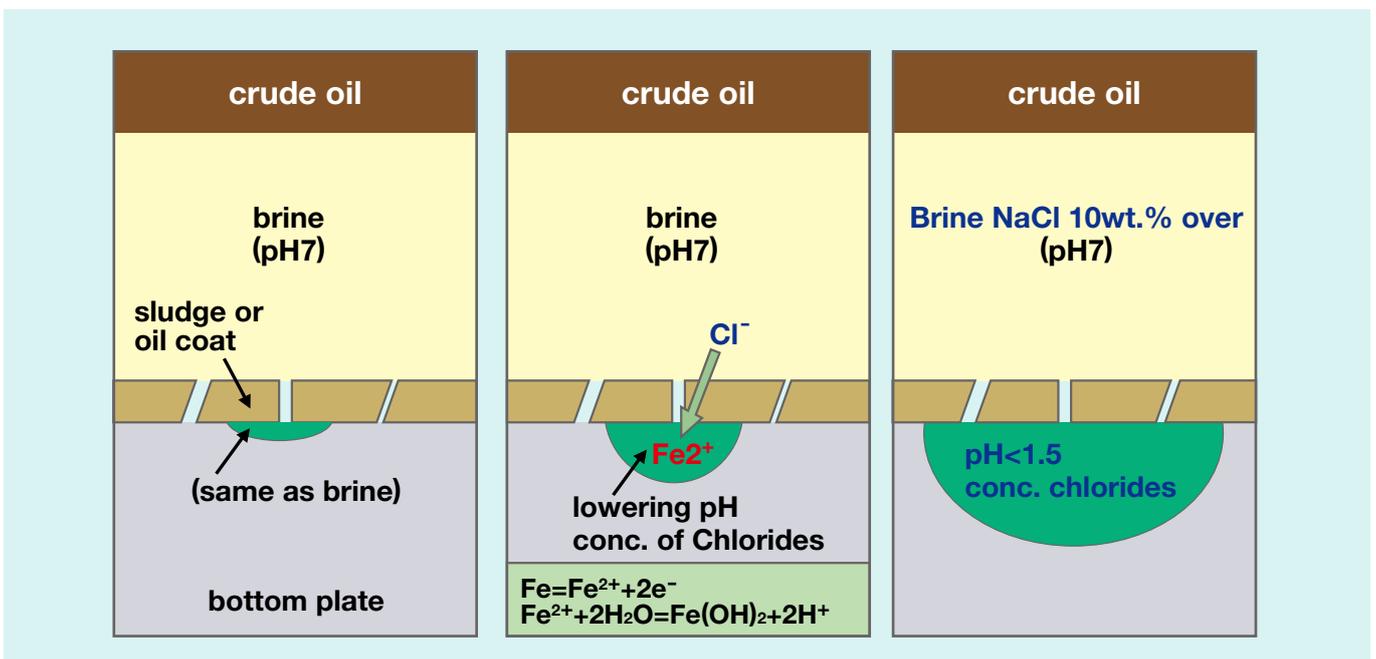
Photo 2: Pitting on NSGP-1 steel plate (uncoated).

Fig. 1: Pit count (unpainted conventional steel)



Conventional steel: Pitting frequency is very high (uncoated DH/COT bottom plates).

Fig. 2: Pit development process



Improving corrosion resistance in environments with low pH and high Cl^- concentrations was essential to the development of NSGP-1 steel.

Technical Essays

the bottom of the tank becomes stratified, with a layer of brine squeezed between the crude oil and a porous sludge/oil that coats the bottom plate. Brine is water with a high salt concentration that naturally occurs in oil fields. When the cargo is loaded, this brine can penetrate the oil coat and come into direct contact with the bottom plate. In this environment, hydrogen ions generated by corrosion of the steel itself accumulate and the pH value decreases rapidly, creating an acidic environment. As a result, corrosion progresses still further, spawning a vicious cycle of corrosion. This concept is shown in Fig. 2. It was with this corrosive environment in mind, that Nippon Steel began development of this new anti-corrosive steel.

As can be seen in Fig. 3, the corrosion rate of conventional steel is pH dependent. As pH decreases (and the environment becomes more acidic), the corrosion rate increases. Fig. 3 however, clearly shows that this relationship does not hold true for Nippon Steel's new anti-corrosive steel plate NSGP-1. Indeed, it can be seen that the new anti-corrosive steel exhibits excellent corrosion resistance, even in highly acidic environments. However, in order to verify these results, it would be necessary to install this new steel on an actual oil tanker.

In cooperation with NYK, the new NSGP-1 steel was applied without coating in six of the fifteen tanks of an actual oil tanker, as can be seen in Fig. 5. Fig. 4 shows the results of the docking inspection which took place two years and three months after the ship's commissioning. As can be seen, there were no pits greater

than 4mm in the tanks where NSGP-1 was applied. This compares extremely favorably to results from the conventional steel shown in Fig. 1, where up to 1000 pits of 4mm or greater developed over the same time period. Following the success of this first test, NSGP-1 has been successfully applied to the bottom plates of the cargo tanks of five additional tankers. As a further result of this research, NYK has decided to apply NSGP-1 to the cargo tanks of all future tanker newbuildings.

When people think of corrosion resistant steel, they normally think of steels with high alloy content, such as stainless steel. However, the amount of additional alloy used in the creation of NSGP-1 is minimal. The new steel also possesses superior toughness compared to conventional steel, while maintaining excellent weldability. Additionally, as this new anti-corrosive steel conforms to IACS requirements for YP36 class steel plate, NSGP-1 steel can be used in much the same way as conventional steels.

Finally, anti-corrosive steel is only slightly more expensive than more conventional steels, and given that anti-corrosive steel plate increases safety while reducing maintenance costs, Nippon Steel expects strong demand for the new NSGP-1 steel plate. Further, while it is not covered here for reasons of space, Nippon Steel has also developed a new anti-corrosive steel plate to address the general corrosion found on the top plates of cargo oil tanks. Nippon Steel believes that the application of these new steels in cargo oil tanks will help lead to a new era of increased oil tanker safety.

Fig. 3: pH dependence of corrosion rate

Fig. 4: Pitting in anti-corrosive steel

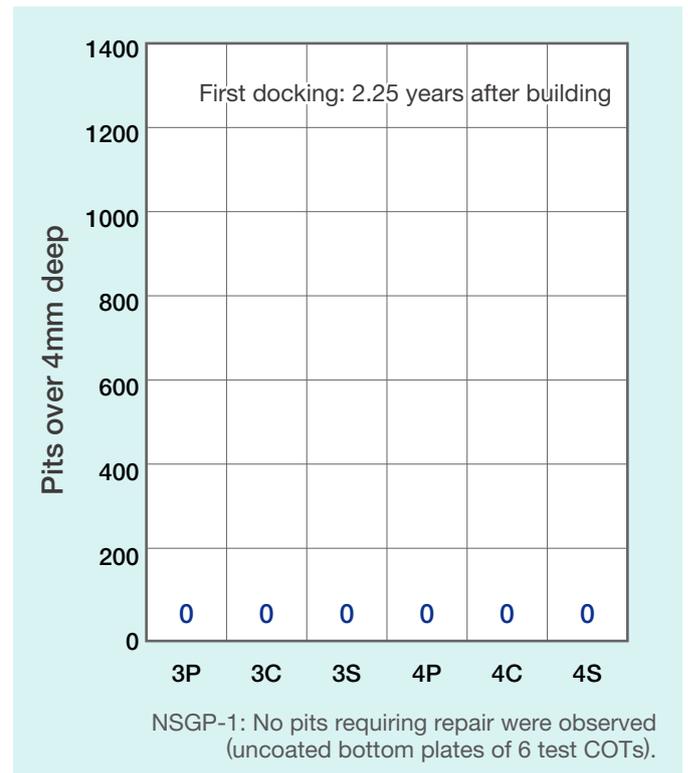
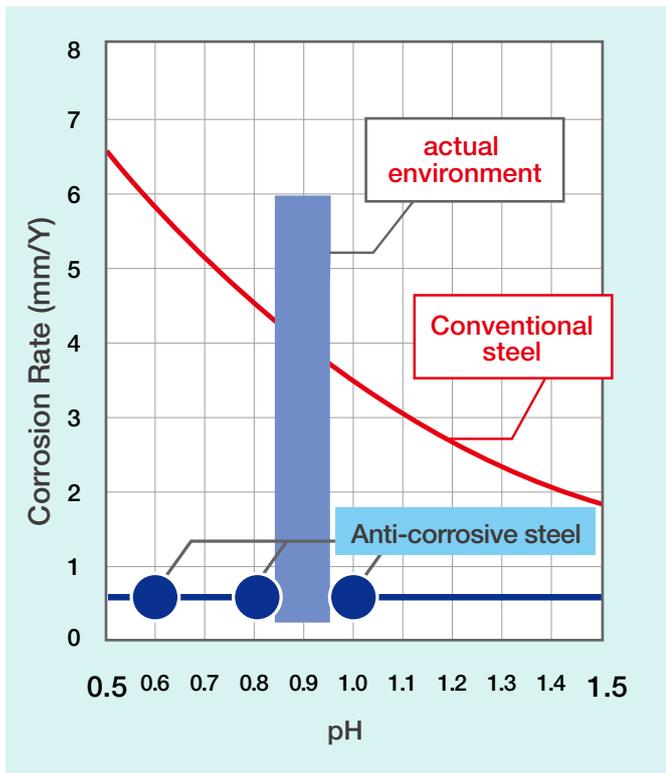
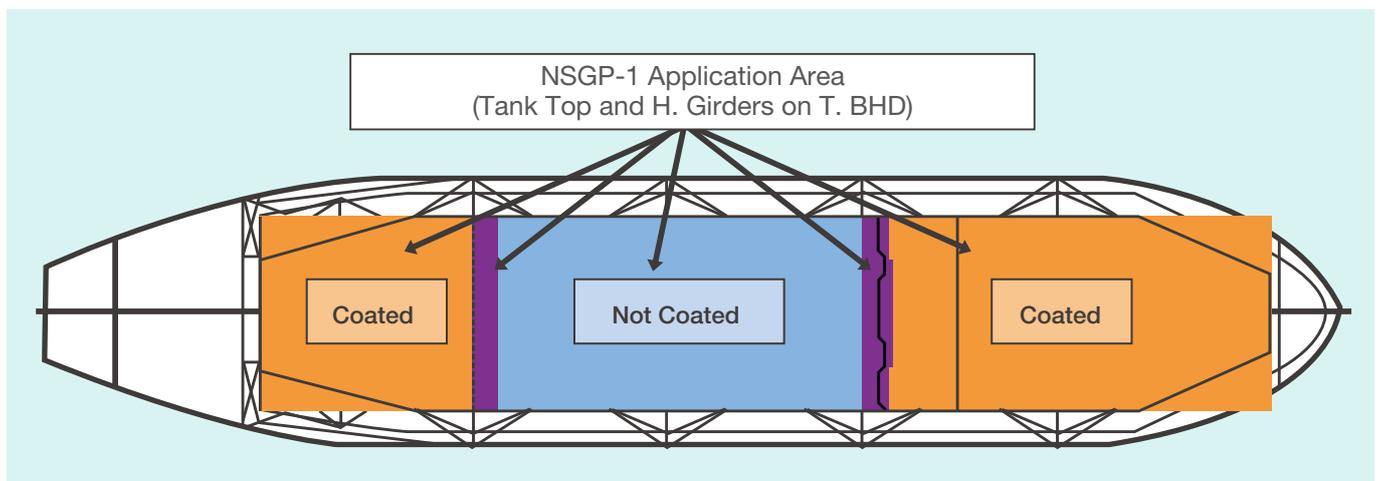


Fig. 5: Example of actual application of new anti-corrosive steel plate



Technical Essays

The Greek Connection

ClassNK expands services to the world's leading shipping nation

The Rise of Greek Shipping

While Greece's history as a shipping nation reaches back thousands of years, the roots of the modern Greek maritime industry are said to reach back to the Napoleonic era. During this period it was Greek sailors who braved the continental blockade to conduct trade. The corps of experienced sailors and fleet that developed from this trade then became a vital part of Greece's victory in its War of Independence from the Ottoman Empire, although the war greatly depleted the nation's commercial fleet.

By the mid-1800s, Greek emigrant communities were already well established throughout the world, especially in port cities like London and Odessa. International businesses run by Greek families, many of which were supported by legendary shipping families like the Ralli family and later the Vagliano family, became well known throughout the world, especially in the textiles



and grain markets. As these markets were upset by the upheavals of the era, including the Crimean War, the Russian Revolution, the First and Second World Wars, and the closing of Egypt to foreign trade, these merchant families turned towards shipowning as a



Piraeus remains the heart of the Greek shipping community.

means to ensure the smooth flow of their cargoes. Among the most important figures of this period was Panayis Athanase Vagliano, often called the “father of Greek shipping”. Vagliano and his brothers had established one of the world’s leading grain companies in Russia before moving to London in the 1850s. From this base in London, Vagliano was able to side step strict Greek commercial laws and offer financing and support to Greek shipbuilding efforts.

Although companies like Vagliano Bros. played an essential role in shipping during World War I, the contemporary Greek shipping industry only began to take shape after the Second World War. In the aftermath of the Second World War, the Greek government guaranteed the purchase of more than 100 liberty ships and tankers from the American government on behalf of the Greek shipping industry. This revitalized the Greek shipping community, and gave birth to the “Golden Greeks” like Stavros Niarchos and Aristotle Onassis. From there, the Greek shipping industry would continue to grow, with the Greek fleet reaching more than 5,000 ships by the 1970s. While the development of newer and larger vessels, as well as the diversification of the world maritime industry, has meant the Greek fleet is now smaller than it once was, up until 2001 more than 20% of the world fleet was owned by Greek owners. However, the size of the Greek fleet is cyclical, and Greek owners are known for their ability to time the sale and purchase of vessels in tune with market trends. As a result of the shipbuilding boom and the current downturn, LR-Fairplay statistics show that the Greek owned fleet has fallen to 15.5% of the world fleet, but UN data shows that companies owned by Greek nationals (including those nominally based in London and New York, but run from Greece), still account for more than 18% of the world’s commercial tonnage. While the Greek fleet maybe smaller than it was a decade ago, there can be little doubt that many Greek owners are simply waiting for the right time to expand their fleets even further.

ClassNK and the Greek Shipping Community

It was in the 1970s that ClassNK first began offering services to Greek owners. Although NK was just beginning to expand internationally at this time, Japan was a rising star in the shipbuilding industry, and many Greek owners began to look to Japan for new ships. ClassNK established its first office in Piraeus in 1975 to serve such owners. The office was one of the first



The ClassNK Greek Technical Seminar

offices established by NK outside of Japan, and helped signal the Society’s emergence as a truly international classification society.

While Greek owners began operating ships under NK class in the 1970s, it was not until the 1980s that NK began developing a large customer base in Greece. It was during this period that cash rich Greek owners took advantage of the oil crisis and the slumping bulk market to purchase large numbers of vessels second-hand. A large number of these vessels were classed with NK and while some ships were transferred to other class societies, many owners chose to keep their vessels classed with NK. As NK won over these owners with its excellent technical service, the number of NK classed vessels owned by Greek owners steadily rose.

This trend continued through the 1990s, but it has been over the last decade that ClassNK has seen its largest growth in Greece. As the market turned upward at the beginning of the 2000s, Greek owners increasingly shifted from the second-hand market to the newbuilding market. Many of these owners had previously purchased NK vessels secondhand and turned to NK for assistance with their newbuilding projects, not only in Japan, but in China, and Korea as well.

These newbuilding projects have greatly increased the Greek-owned share of NK classed ships. At the beginning of 2009, Greek owners accounted for more than 10% of ClassNK’s total client base, and Greek owned ships make up some 10% of the NK register’s total gross tonnage. With many newbuildings still under construction or on order, this number is expected to increase over the next several years.

Expanded Services and Recent Events

With a growing number of Greek clients, ClassNK has steadily increased its presence in the market and expanded the range of services it provides to Greek owners. In 1992, for example, the Society established the ClassNK Greek Committee. The Committee has provided an essential avenue of communication between ClassNK and the Greek ship owning community, allowing ClassNK to better adapt its services to the Greek market. Currently chaired by Transmed Shipping's Charalambos Mylonas, the Committee has expanded to 19 members, including many of the most influential figures in Greek shipping. As this year NK celebrated the 110th anniversary of its founding, this year's committee meeting was followed by an impressive celebration to thank the Greek community and the Committee members especially for their excellent support.

Along with the increased number of newbuildings, ship and shipbuilding technologies, as well as rules and requirements have become more and more complex over the past decade. In order to best help Greek owners deal with new technical issues, ClassNK established the Greek Technical Seminar in 2004. Over the years, the Technical Seminar has covered everything

from the latest developments at IACS, to ballast water management, and even hull damage and repair. However, in order to provide a regular space where the technical managers of Greek shipping companies could discuss new technologies and regulation changes, this year ClassNK established the new Greek Technical Committee. The Greek Technical Committee is chaired by Marios Stafilopatis, owner of the Byzantine Maritime Corporation, and has 38 members drawn from the technical management of Greece's leading shipping companies. Just as the Greek Committee is a place for NK to present the latest information on the Society's activities and recent market developments, the Technical Committee is an open forum where opinions on technical issues and potential solutions can be exchanged and thoroughly discussed.

Though ClassNK's relationship with the Greek shipping community reaches back only a few decades, Greek owners already make up NK's third largest group of clients, following only Japan and Singapore-based owners. ClassNK is committed to providing the Greek shipowning community with the best service possible, and will continue to expand these services in the future to meet the growing and changing needs of the Greek maritime industry.

GREEK COMMITTEE

Chairman Members

Mr. Charalambos N. Mylonas
Mr. Markos A. Nomikos
Mr. Michael D. Chandris
Mr. George J. Souravlas
Ms. Anna G. Dracopoulos
Mr. Prokopis N. Karnesis
Mr. Kriton Lendoudis
Mr. Michael E. Veniamis
Mr. Ghikas J. Goumas
Mr. Dimitris Z. Kritsas
Mr. Panagiotis C. Laskaridis
Mr. Diamantis P. Diamantides
Mr. Theodore P. Angelopoulos
Ms. Angeliki Frangou
Mr. Thanos G. Crassaris
Mr. George S. Livanos
Mr. Constantinos J. Martinos
Capt. Panagiotis N. Tsakos
Mr. Michael M. Scufalos

Chairman
Director
Chairman
Technical Director
Director
Director
Managing Director
Director
Director
President
Managing Director
Managing Director
Chairman of the Board & CEO
Technical Director & General Manager
Chairman
Managing Director
President
Managing Director

Transmed Shipping Ltd.
A. M. Nomikos Transworld Maritime Agencies S.A.
Chandris (Hellas) Inc.
Elmira Shipping and Trading S.A.
Empros Lines Shipping Co. SP. S.A.
European Navigation Inc.
Evalend Shipping Co. S.A.
Golden Union Shipping Co. S.A.
J. G. Goumas Shipping Company S.A.
Kritsas Shipping S.A.
Laskaridis Shipping Co. Ltd.
Marmaras Navigation Ltd.
Metrostar Management Corp.
Navios Maritime Holdings Inc.
Springfield Shipping Co. Panama S.A.
Sun Enterprises Ltd.
Thenamaris Ships Management Inc.
Tsakos Shipping & Trading S.A.
Union Commercial Inc.





GREEK TECHNICAL COMMITTEE

Chairman
Members

Mr. Marios Stafiloipatis
 Mr. P. E. Antonelos
 Mr. Christos C. Hadji Georgiou
 Mr. Haris G. Giantzikis
 Mr. Demetrios Koukoulas
 Mr. George Kourelis
 Mr. Michael D. Kapsorrachis
 Mr. Dionisios Kourouklis
 Mr. George Alexandridis
 Mr. George J. Souravlas
 Mr. Costas Petsas
 Mr. Nikolaos Petromylonakis
 Mr. Leontios Pitaoulis
 Mr. Stefanos Georgiou
 Mr. George H. Paschalis
 Mr. Dimitrios Theodoropoulos
 Mr. Christoforos E. Andreadis
 Mr. Anastasios Kalogiannis
 Mr. Dion Theodorou
 Mr. Takis Koutris
 Mr. John A. Yiannakenas
 Mr. Nick Argyros
 Mr. John N. Ioannidis
 Mr. Theodoros Pavlidis
 Mr. Nikolaos Balalis
 Mr. Amir Geva
 Mr. Paraskevas Koutsoukos
 Mr. Elias A. Galanopoulos
 Mr. Michael Anagnostou
 Mr. Achilleas Avlonitis
 Mr. Dimitris C. Makris
 Mr. Frantzeskcs D. Kontos
 Dr. Vasileios Lampropoulos
 Mr. Manolis G. Koutlakis
 Mr. C. Dean Tseretopoulos
 Mr. Savvas D. Papadatos
 Mr. Constantinos M. Metaxas
 Mr. Takis Koutouras

Owner
 General Manager
 Technical Manager
 Technical Manager
 General Manager
 General Manager
 Technical Manager
 Director Marine Operations
 Technical Coordinator
 Technical Director
 Technical Manager
 Technical Manager
 Technical Manager
 Technical Director
 Chief Operating Officer
 Technical Manager

 Technical Manager
 Managing Director

 Technical Director
 Technical Manager
 Technical Director
 Technical Director
 Manager
 Managing Director & Technical Manager
 Managing Director
 Managing Director & Technical Manager
 Technical Manager
 Technical Manager
 Technical Director
 Technical Department Manager
 Technical Manager
 Naval Architect-Marine Engineer, MBA
 Special Projects & Claims Manager
 Technical Manager
 Technical Manager

Byzantine Maritime Corporation
 A. M. Nomikos Transworld Maritime Agencies S.A.
 Almi Marine Management S.A.
 Arcadia Shipmanagement Co., Ltd.
 Cardiff Marine Inc.
 Cardiff Marine Inc.
 Centrofin Management Inc.
 Chandris (Hellas) Inc.
 Dynacom Tankers Management Ltd.
 Elmira Shipping & Trading S.A.
 Empros Lines
 Entrust Maritime Co. Ltd.
 Equinox Maritime Ltd.
 European Navigation Inc.
 Evalend Shipping Co. S.A.
 Franco Compania Naviera S.A.
 Golden Union Shipping Co. S.A.
 Iolcos Hellenic Maritime Enterprises Co. Ltd.
 Konkar Shipping Agencies S.A.
 Kristen Marine S.A.
 Kritsas Shipping S.A.
 Laskaridis Shipping Co. Ltd.
 Maryville Maritime Inc.
 Metrostar Management Corp.
 Navios Shipmanagement Inc.
 Ofer (Ships Holding) LTD.
 Paradise Navigation S.A.
 Regal Mare Inc.
 Roswell Navigation Corp.
 S. Frangoulis (Ship Management) Ltd.
 Springfield Shipping Co. Panama S.A.
 Sun Enterprises Ltd.
 Thenamaris Ships Management Inc.
 Transmed Shipping Ltd.
 Triple Tee International Ltd.
 Tsakos Shipping and Trading S.A.
 Union Commercial Incorporated
 Z & G HALCOUSSIS Co. Ltd.

Yokohama

Celebrating 150 years as an international maritime city

The unexpected arrival of the American Navy's "black ships" off the coast of Yokohama in 1853 remains one of the most important moments in the history of modern Japan. Following the arrival of Admiral Perry and his ships, Japan's "Sakoku" policy of isolation was overturned, and Japan signed agreements allowing trade with America and the other great powers for the first time. As a result of these treaties, the Port of Yokohama was officially opened to foreign trade in 1859, and this year Yokohama celebrated its 150th anniversary as an international port.

Over the 150 years since its opening, the Port of Yokohama has grown to become the main commercial port of the Tokyo Metropolitan Area, Japan's largest consumer market. As the Port of Yokohama has grown to become Japan's busiest port, the surrounding area has developed as well, and the Keihin Industrial Zone, the concentrated industrial belt that stretches along the



coastline between Tokyo and Yokohama, has become Japan's most important industrial region. Blessed with such an excellent location and naturally deep harbors, Yokohama is internationally recognized as one of the world's leading ports.



The Port of Yokohama



"Yokohama Kaigan no Zu", a famous painting depicting the bustling trade at the Port of Yokohama in 1870.

Although roughly one-third of Yokohama's working population currently works in the maritime industry and the port and its related industries bring in roughly one-third of the city's total income, Yokohama was not always known as a port city. When the Port of Yokohama was opened in 1859, Yokohama was an idyllic fishing and agricultural town. The port itself did not begin to take its current shape until the Meiji Era, when modern infrastructure like bridges, berths and sea lanes were established. As a result of these modern developments, the Port of Yokohama became known as the "the most modern port in the orient", and the "port town" of Yokohama came to be known around the world.

More recently, the Port of Yokohama has been actively transformed into a container port. Beginning in the 1960s with the development of containerized cargo, container traffic has steadily increased at the port. Yokohama is currently serviced by more than 100 container routes, and container and semi-container (Ro-Ro, etc) vessels make up more than half of the Port's total traffic. In line with its impressive cargo volumes, the infrastructure and container terminals that make up the bulk of the Port are equally impressive. The Minami-Honmoku Pier in particular, is among Japan's largest container piers. In addition to its MC-1 and MC-2 Terminals, two new terminals, MC-3 and MC-4,

have been under construction since 2007. When completed they will be the first terminals in Japan to have berths greater than 20m deep. These two new natural deep water berths will have depths of roughly 27m, and will be able to serve even the largest container vessels.

Of course, ports do not exist in isolation. A port is rather one element in a greater network of maritime businesses, and as such, you can always tell a great port by the high quality of its surrounding maritime and industrial sector. For Yokohama, this is the Keihin Industrial zone. During Japan's long economic boom in the 1960s, the industrial region between Yokohama and Tokyo grew so rapidly that space quickly ran out. In order to meet the demand for new growth, a massive land reclamation project was started, greatly increasing the size and scope of the region, and allowing the area to become an unrivaled industrial center.

Far more than just being a major industrial region, the Keihin industrial zone is home to some of Japan's most famous and most important maritime companies, and ClassNK Magazine took advantage of the opportunity presented by the 150th anniversary celebration of the opening of the Port of Yokohama to visit two such companies, IHI Marine United's Yokohama Shipyard and JFE Steel East Japan Works' Keihin Plant.



IHI Marine United Yokohama Shipyard

IHI Marine United Yokohama Shipyard

Of the roughly twenty active shipbuilding and repairs yards in the Yokohama area, among the most famous and well respected is the IHI Marine United Yokohama Shipyard. The Yokohama Shipyard produces an incredible number of vessels each year, primarily bulk carriers, ferries, and workboats. These three ship types alone make up some three quarters of the yards total production. Although the yard has produced a number of noteworthy vessels, including the *Idemitsu Maru*, the world's first 200,000 dwt class VLCC built in 1966, the yard is undoubtedly best known for its "F-Series" of bulk carriers. Since the yard's founding it has built more than 1,000 "F-series" vessels, and the series remains incredibly popular throughout the world to this day.



A bulk carrier under construction at IHI MU Yokohama Shipyard.

In addition to an excellent record building commercial vessels, one of the yard's distinguishing characteristics is the yard's long history of building specialized naval and patrol vessels. Due to their importance for national security, naval vessels and patrol ships often represent the cutting edge in naval technology, and the Yokohama Shipyard has extensive experience building ships with the advanced features and high quality demanded by its government customers. One of the

advantages for IHI is that the technical capabilities developed from working on these vessels can then be used to build higher quality and more advanced commercial vessels. The high quality of the vessels built at the Yokohama yard has thus become an essential element of the IHI brand.

The Yokohama Shipyard's activities, however, are not limited simply to ship construction. The yard is also well known for its ship repair capabilities. The yard's massive dry docks allow two ships of up to 200m in length to be repaired at the same time. These dry docks are complemented by two floating docks, which greatly increase the yard's repair capacity. Equally, IHI Yokohama is one of the few shipyards in Japan to have docks equipped with sonar pits, further cementing IHI's position as one of the leading yards for the repair of naval vessels.

In much the same way that the Port of Yokohama has leveraged its excellent location through proactive development, IHI is using its technical capabilities and experience, as well as its reputation for high quality, to ensure its continued success as one of the world's leading shipyards.

JFE Steel East Japan Works Keihin Plant

Just off the coast to the northeast of downtown Yokohama, at the heart of the Keihin Industrial Zone, is the man-made island of Ohgishima. It was on this 6km² island that Japan's first privately owned steelworks was established. That steel works remains in operation today as part of JFE Steel's East Japan Works Keihin Plant. While at one time the steelworks included a number of facilities located throughout the Keihin area, out of concerns for the environment and in an effort to improve efficiency, all of the steelworks' facilities were relocated to a single location on Ohgishima in 1976.

JFE is well known throughout the world as the maker of such advanced steels as its 6.5% silicon content steel and the new NANOHITEN high tensile steel plate. With JFE steel currently the world's fourth largest producer of steel, JFE is also one of the most important companies in Yokohama's maritime industry. Ships carrying JFE's products to ports both within Japan and around the world depart from Ohgishima's western loading dock almost daily.

The main reason that JFE has been so successful in producing such well regarded, high tech steels is JFE's commitment to using the latest in production machinery and technology. The Keihin Plant's plate mill, for example boasts a new *Super-OLAC* (On-Line Accelerated Cooling) system. The system cools steel plate immediately after hot rolling. Allowing JFE to produce low carbon equivalent (Ceq) type steels with excellent strength and toughness. JFE has also been one pioneers of TMCP (Thermo-Mechanical Control Process) steels, which are widely used for their excellent strength, toughness, and weldability.

JFE also makes steel plate specifically for use in shipbuilding, such as LP (Longitudinally Profiled) steel plate. LP steel plate has been designed to meet the design strength requirements for the parts of the ship with differing steel thickness, such as bulk heads and ship bottoms. In addition to reducing weight, the use of such steel allows ships to be built with fewer welds. The reduction in weight allowed by the use of LP and TMCP steels contributes greatly to the preservation of the environment by reducing the emissions from ships.

However, JFE's commitment to the environment



The Keihin Plant's *Super-OLAC* system

goes far beyond just research and development. The company has instituted strict environmental protection policies, leading not only to a reduction in NOx and SOx emissions, but also increased energy and resource conservation. Thanks to these efforts, the Keihin plant is able to recycle 93% of the water used in the production process. In addition to recycling the materials used in the manufacturing process itself, JFE recycles the steel slugs that are produced as a byproduct of the manufacturing process. The slugs are excellent growth beds for coral and marine vegetation and are reused in underwater environmental protection and conservation projects.



A coal conveyor at JFE Steel's Keihin Plant

As a result of JFE efforts toward energy and resource conservation, over the past 35 years JFE has reduced the amount of energy used in its plants by 35%, putting JFE among the world's corporate leaders in energy conservation efforts. Such proactive efforts in confronting global challenges like environmental protection, along with the companies continued success in the development of new and advanced steels, make evident the leadership that has made JFE one of the most esteemed businesses in the maritime community.

The Port of Nagasaki

The changing face of one of Japan's oldest international ports

Located some two hours away from Tokyo by plane, Nagasaki prefecture encompasses not only the western tip of Kyushu, one of Japan's four main islands, but also an entire archipelago of 73 inhabited islands, the most of any Japanese prefecture. Although the prefecture boasts more than 104 harbors, Nagasaki Bay is without a doubt the largest and most important. Known as the "Bay of Cranes" for its long wing-like shape, the bay's natural advantages have meant that Nagasaki has served a variety of purposes in its long history. In addition to being the main port for the surrounding islands, the Port of Nagasaki has served as a trade port, an industrial port, a commercial port, and now it has set its eyes on becoming a tourist port, as well. In order to understand how the city is approaching this transformation, ClassNK magazine paid a visit to Nagasaki examine the history of the city's port and its plans for future development.



The History of Nagasaki

In order to understand the Port of Nagasaki's future, however, it is vital to understand Nagasaki's past. As an island nation, Japan's leading ports are not only vital to the nation's economy; they are among the



Nagasaki's Matsugae area, with the Nagasaki Seaside Park in the foreground.

Focus on Japan

The Port of Nagasaki

county's most historically significant locations. Among these ports, however, almost no port has a richer history than the Port of Nagasaki. The port's history as international port reaches back almost 400 years to the arrival of the Portuguese, who were among the very first westerners to visit Japan. From that period on, Nagasaki became the entry point for the as of yet unknown western culture, and Nagasaki became closely associated with Portuguese guns, gunpowder, and the now locally-famous "Castella" sponge cake.

However shortly after the arrival of the Portuguese, the "Sakoku" isolation policy established by the Tokugawa Shogunate closed Japanese ports to foreign ships and outlawed the entry of foreigners into Japan. During this period, Nagasaki was designated as the sole port allowed to handle foreign trade, and the city's Dejima trading post became the central point for both trade with the Dutch East India Company and with nearby China. As the only entry point for foreign goods, Chinese and Portuguese culture slowly intermingled with local Japanese customs, creating the exotic atmosphere that Nagasaki remains well known for to this day.

With its rich historical background and numerous geographical advantages, it is easy to see how international trade and the maritime industry became central to economy of Nagasaki and the lifestyle of its citizens. Far more than just supporting the livelihoods of the inhabitants of the surrounding islands, Nagasaki's port and the related industries that built

up around it became the driving force behind the city's growth and development.

We began our visit to Nagasaki by speaking with Hiroaki Fujisawa, Assistant Director of the Nagasaki Prefectural Government's Ports and Harbors Division. "From the very beginning," he noted, "Nagasaki was built as a port city. Yet, it is impossible to deny how



The Megami Bridge



Ooura Church



A folding screen depicting Nagasaki from the Kanbun Era (1661-1673).

important the maritime industry has been for the development of modern Nagasaki as well.” He added that, “Roads and railways for transporting cargo on land are obviously vital for developing and maintaining an international port.

However, it goes far beyond just port infrastructure. In order to prevent the spread of foreign diseases, for example, it is necessary to establish water and sewer systems and other infrastructure essential for the life of the common people.” Put in such simple terms, it is easy to see how the port would have a large influence on the development of the city and the lifestyle of its citizens.

As our conversation with Mr. Fujisawa continued, we turned to more modern times. “A perfect example,” he told us, “is Mitsubishi Heavy Industries. From the moment MHI first started business here, it has played an essential role as one of the city’s main industries. As the largest industrial employer in the region, MHI has had an incredible impact on the economy of not just the city, but the entire prefecture.”

Nagasaki and MHI

That our conversation should turn to Mitsubishi Heavy Industries should be of no surprise to those familiar with Japan or Nagasaki’s history. Indeed, it would be impossible to overstate the importance of MHI’s Nagasaki Shipyard and Machinery Works to the develop-

ment of the city (see page 27). Looking down at the city from one of surrounding mountains, the yard not only succeeds in being the city’s central focal point, but also seamlessly blends with the cityscape below. While many cities are a patchwork of industrial, commercial, and residential areas, Nagasaki and the Nagasaki Shipyard and Machinery Works seem to be woven from the same cloth.

Yet the Nagasaki Shipyard and Machinery Works is more than just a local employer, the yard’s work has become central to the city, and its future development. Perhaps nothing captures this spirit more than the Megami Bridge, which was constructed at the Nagasaki Shipyard and Machinery Works’ Koyagi Plant in 2005. Completed in 2006, the Megami Bridge spans the Nagasaki Bay, connecting the southern and western portion of the city. In addition to being the longest cable-stay bridge on the island of Kyushu, it has quickly become one of Nagasaki’s signature landmarks. While many might think that the bridge’s height is a merely a design element, the bridge was built with Nagasaki’s future as a tourist port in mind; its height makes it possible for even the largest cruise ships to pass safely beneath it.

Of course, MHI’s contribution to the city’s development as a tourist port goes beyond the Megami Bridge. During our visit to Nagasaki, we also spoke with Yoshihiro Honda, Engineering Manager in the yard’s Shipbuilding Administration Department. He



The view from Minami Yamate

told us: “At the Nagasaki Shipyard and Machinery Works, we make ships to match our local port, the Port of Nagasaki, and we hope that those ships will go forth, and eventually return here to Nagasaki. It is our goal to develop together, hand-in-hand with the port.” The truth of Mr. Honda’s words is apparent in the passenger ships the yard builds. The Nagasaki Shipyard and Machinery Works is one of few yards in the world capable of building cruise vessels, and the vessels that MHI has built not only call at Nagasaki’s port, they are one of the central elements in Nagasaki’s plan for future development.

Port Redevelopment and the Future of Nagasaki

Just as Nagasaki’s history has helped make it an important cargo port and maritime city, its history has provided the city with numerous attractions for visiting tourists. The city’s long interaction with western culture has blessed the city with some of the oldest and most spectacular western style buildings in Japan, and indeed all of Asia. In addition to historic structures like the Glover Gardens and the Ooura Church (one of Japan’s national treasures), Nagasaki is well known internationally as the setting for Puccini’s opera “Madame Butterfly”, as well as for the peace park that was erected in memoriam for those killed by the detonation of the atomic bomb in the Second World War. The city’s international recognition has meant that it has long been a tourist destination, and both domestic and international cruise lines have made Nagasaki a port of call for some time. Nevertheless, given the city’s long international history and proximity to both Korea and China, it makes sense that it would be this facet of the port’s services that Nagasaki would look to expand and develop.

The plan to redevelop Nagasaki as a more citizen friendly port was initially established in 1986. In the 23 years since the plan’s implementation, Nagasaki has undergone some dramatic changes. Foremost among these is the development of the Matsugae area, especially the creation of the Nagasaki Seaside Park. The park has helped revitalized the portside region, creating a new beautiful green space that already draws more than 1 million visitors per year.

Alongside the new park, the major development in the region is a new Matsugae International Passenger Ship Wharf, a cruise terminal capable of berthing cruise ships of up to 100,000 gt. Construction of the international cruise terminal, which began in 2009, is



Peace Statue in the Nagasaki Peace Park



The Port of Nagasaki

slated to be finished in early 2010. The new terminal promises not only first class amenities, but quick and easy access to nearby sights like the Glover Gardens and the new Nagasaki Seaside Park. In many ways, it will be a new gateway to a revitalized Nagasaki. Towards the end of our discussion, Mr. Fujisawa told us: “The redevelopment of the Matsugae area is an ongoing project. Progress is being made on the international cruise terminal and the surrounding green space, and next March, when the terminal is finished, we will see the birth of a new Nagasaki.”

With a strong local shipbuilding industry dedicated to the city’s continued success, a growing international tourist industry, and a newly redeveloped port area, it is easy to agree with Mr. Fujisawa, who noted: “A more beautiful, more exciting and more prosperous Port of Nagasaki is something that can we all look forward to.”

The Nagasaki Shipyard and Machinery Works is among the most storied shipyards in Japan. Established in 1857, the yard was Japan's first repair yard for naval vessels. Over the following years, the Nagasaki shipyard would become the first yard in Japan to begin building western style vessels, and would build such historic vessels as the cargo ship *Hitachi Maru* and the battleship *Kirishima*. In addition to building some of the most important Japanese ships, the yard was also one of the first in Japan to produce electric generators. These two industries, shipbuilding and power plant manufacturing, would become the yard's, and in turn Nagasaki's, primary businesses. Over the years, the Nagasaki Shipyard and Machinery Works would grow to be one of the world's leading shipyards, and from 1956 to 1966 the yard launched more total tonnage than any other yard in the world.

While it is easy to treat the Nagasaki Shipyard and Machinery Works as a single facility, the reality is that the Nagasaki Shipyard and Machinery Works is actually made up of three separate facilities within the city's boundaries – the Main Plant, Koyagi Plant, and Saiwaimachi Plant. The Main Plant and Saiwaimachi Plant are located in the heart of the city, not far from Nagasaki Station, while the Koyagi Plant is located at

the outer edge of the city along the Nagasaki Bay. Of these facilities, the Main Plant and Koyagi Plant are full fledged shipyards with dedicated turbine and boiler manufacturing facilities, while the Saiwaimachi plant houses the yard's foundry shops, and produces turbochargers, and other special machinery.

While the Main Plant boasts a longer history, having celebrated its 150th anniversary in 2007, the Koyagi Plant is the larger of the facilities. With a goliath crane capable of lifting 1,200 tons towering over a kilometer long dock, the Koyagi Plant is one of Japan's largest shipbuilding facilities. This space is put to use building LNG and LPG carriers, as well as VLCCs and other oversized vessels. Yet the yard's work is not limited to just commercial cargo vessels. The technical capabilities of the Koyagi Plant extend to naval vessels, drill ships, ferries and even the construction of cruise ships. More recently, the yard has turned towards the construction of high value-added, environmentally friendly ships with energy conserving features.

During our visit to the Koyagi Plant, Yoshihiro Honda, Engineering Manager in the yard's Shipbuilding Administration Department, told us that yard's wide ranging technical capabilities were a result of MHI's



The Main Plant

“combined approach to shipbuilding.” This “combined approach” that Mr. Honda refers to, is MHI’s signature combination of its shipbuilding and research facilities. Indeed, the main branch of MHI’s Nagasaki R&D Center sits adjacent to the Koyagi Plant. During our discussion Mr. Honda told us: “It is extremely rare for a company’s research center to be located so close to an actual shipyard, but I think that having the R&D Center right next to the shipyard is our greatest strength. It makes it possible for us to take the results of the latest research, and quickly and practically apply them to actual shipbuilding.”

One example of the successes that this approach has made possible is MHI’s line of container ships. Thanks to the Nagasaki R&D Center’s experimental water tank complex, the largest such privately-owned and operated complex in the world, MHI has developed a newer, more efficient hull shape for its already renowned container vessels. The new vessels require 14-20% less horsepower to achieve the same propulsion characteristics of earlier designs, allowing MHI to replace the standard 12-cylinder engine with a lighter and more efficient 11-cylinder model. Such successes have come alongside the numerous advances the Nagasaki R&D center has helped MHI make in the field of environmentally friendly technologies, including Flex electric main engines, and Ultra Steam Turbines (UST) for LNG carriers.

While for some companies such advanced and extensive research might be abandoned given the harsh realities of the current shipping market, such is not the case for MHI. In fact, MHI’s restructuring in October of this year was designed to further strengthen the research initiatives being undertaken by the Nagasaki R&D Center. Mr. Honda explained the changes to us thusly: “In this current tight market, it is not simply enough to have the most advanced research, it is important to be able to take that research and release it to the market. With the reorganization, we have taken the development and design staff from our Kobe and Shimonoseki branches and combined them with our staff here in Nagasaki. ” He summed up the importance of the new reorganization by saying: “We can now move products from the development stage to the design and production phases faster than ever before. ”



The Koyagi Plant's mammoth Goliath Cranes



Newbuilding construction at the Koyagi Plant

Environmental Focus

Introducing ClassNK's newest environmental services



In response to increasingly strident demands for environmental protection from around the globe, the maritime industry has begun a number of important initiatives intended to help better protect the environment. These include measures to prevent marine pollution from oil spills and discharges caused by disasters or ship casualties, measures to prevent atmospheric pollution from ship exhaust gasses, measures to prevent destruction of eco-systems, measures to prevent marine pollution from maritime paints, measures to conserve energy, and so on. Many of these efforts are driven by international treaties, the IMO and other international bodies. However, the actual implementation of these efforts is often a difficult and time-consuming task. At the same time, although maritime companies are increasingly developing their

own environmental initiatives that exceed existing regulations, questions remain as to how to best assess and certify such practices.

As a class society dedicated to not only preventing marine pollution, but supporting the activities of the entire maritime industry, ClassNK works both independently and with other maritime stakeholders to find the best solutions to these challenges. Among the many services being offered or currently in development by the Society, this article will introduce three of the services that best represent ClassNK's holistic approach to supporting the maritime industry's efforts to protect the environment: the 10 Mode Performance Index for Ships, Environmental Awareness Notation, and the new PrimeShip-INVENTORY software.

10 Mode Performance Index for Ships

While ships can be made more environmentally friendly through the addition of equipment like ballast water treatment plants, the most dramatic improvements to emission levels and ship efficiency are likely to be made at the design stage. One of the obstacles preventing such design improvements, however, has been the lack of an effective and realistic performance evaluation method for ships. While ships are evaluated during sea trials, these trials are conducted in calm ocean conditions, and ship performance can vary radically from these levels once operating in real ocean conditions. As a result, two ships which have the same efficiency in calm seas can have dramatically different performance profiles when operating in real wind and waves. At the same time, differences in weather, trading routes, and loading conditions make it difficult to compare performance once ships enter operation.

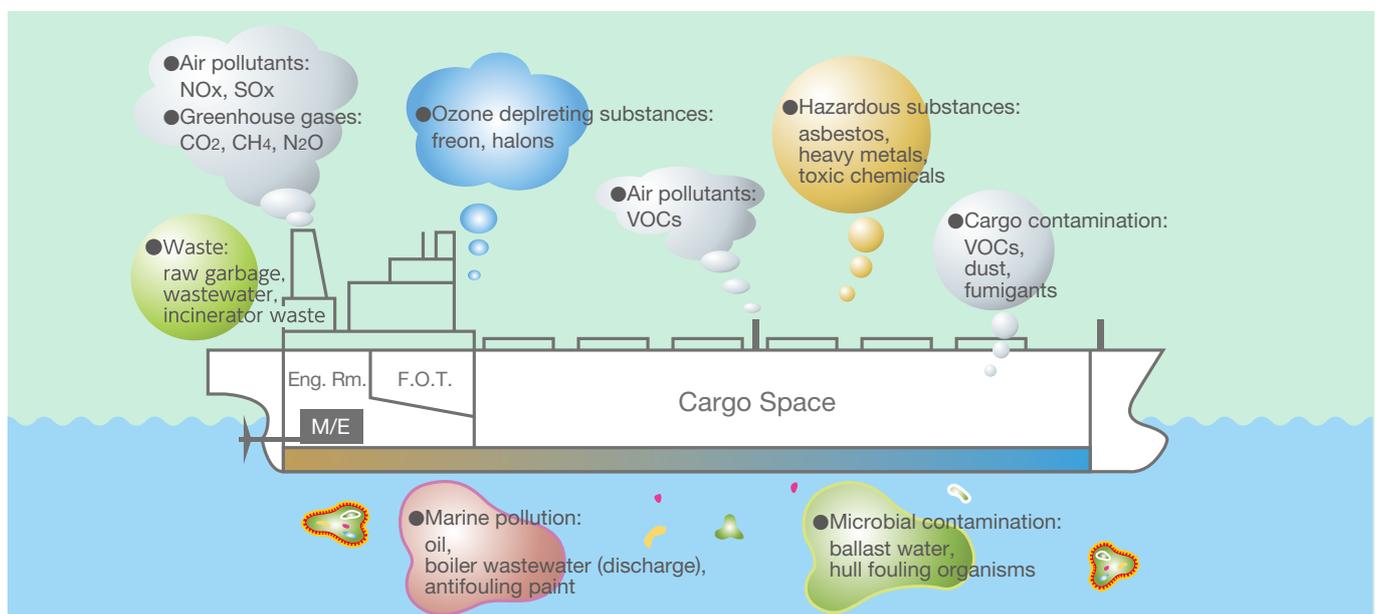
In order to develop a more realistic performance evaluation for ship designs prior to construction, ClassNK began working on a new 10 Mode Performance Index for Ships in cooperation with the Japan Ship Technology Research Association, the National Maritime Research Institute, and other interested parties in the maritime industry. This new performance index takes its inspiration from the automotive industry, which uses a multiple mode (environmental/operational condition) system for determining fuel efficiency, as opposed to the single mode system (model test in still water/calm seas during sea trials) currently used by the maritime industry.

As part of this research, ClassNK and its research partners together developed a hybrid calculation method consisting of theoretical calculations and tank testing capable of replicating the wind and waves found in real ocean conditions. In order to ensure the test method accurately reflects conditions, data from tank tests was compared with actual data taken from ships in service, and the differences in the data were then used to create a more accurate hybrid calculation method. This new performance evaluation method will finally allow shipbuilders to offer realistic performance evaluations for ships at the design stage. This will further allow shipowners to make better informed decisions about the ships they are purchasing, and lead to more efficient ships designs.

Fig. 1: Ship related environmental issues and related international conventions



Fig. 2: Major causes of environmental damage from ships



ClassNK will release new guidelines on the application of this 10 Mode Performance Index and begin certifying testing in accordance with the method in 2010. While the initial evaluation method and guidance only apply to container vessels, the performance evaluation method will be expanded to other vessels in the future. In this way, ClassNK hopes to support the design and development of more environmentally friendly ships.

Environmental Awareness Notation

Efforts to protect the environment are not limited to the shipping and shipbuilding sectors. The port sector as well, is proactively addressing environmental issues by offering a range of incentives, such as reduced port duties, to ships that meet standards adopted by ports and port states. The Port of Vancouver, for example, offers reduced harbor fees for ships that have obtained an environmental certification from a port-certified class society. In a similar fashion, ships that have been certified by the Green Award Foundation are entitled to various incentives at more than twenty ports around the globe. Other ports, such as Long Beach and Tacoma on the west coast of the U.S.A., work to protect the environment by making ship-to-shore electrical power hookups (i.e. cold ironing) mandatory.

In 2007, ClassNK began a research program to study the best way to certify ships not only with the above programs in mind, but also in light of the requirements of the international treaties expected to be

enforced in the coming years. Upon completion of this program in 2008, ClassNK began a new program to certify ships with environmentally friendly features. As a result of the program, certificates were awarded to ships that met requirements with regards to certain standards concerning, for example, international treaty requirements and NO_x, SO_x, and VOC emissions, as well as for ships that included additional features like protective bilge controls and N₂ generators.

As environmental protection is one of the essential elements of ClassNK's mission, however, it was decided that an additional certification alone was not enough, and efforts were begun to codify the new environmental certification as part of the Society's rules. The result of these efforts was ClassNK's new Environmental Awareness Notation service based on the new ClassNK "Environmental Guideline" published in May 2009. This new guidelines incorporates the contents of the certification program, and expands upon it, allowing ships with environmentally friendly features to have the Environmental Awareness Notation added to their classification characters. The notation provides owners with a simple, useful certification of their ships environmentally friendly features. As part of this notification system, an 'additional feature' notation can also be added to the class characters, ensuring that even ships which make new equipment or features that are not yet covered by international regulations are included in the classification system.

PrimeShip-INVENTORY

Concerns about the environmental friendliness of the maritime industry extend beyond just shipbuilding and ships in operation, and in recent years the ship recycling industry has become a central focus for environmental concerns. Critics have pointed out that the poor working conditions and lack of proper facilities pose a threat not only to the lives and livelihoods of those working in such facilities, but also to the environment. Further, when a ship is recycled there is no requirement for a manifest or list of dangerous substances used in the ship or where are they stored, raising additional environmental and safety issues.

In order to address these problems, government and NGOs began to develop an international treaty to mandate improved safety and environmental protec-

Fig. 3: Ships which perform similarly in sea trials can perform differently in real conditions.

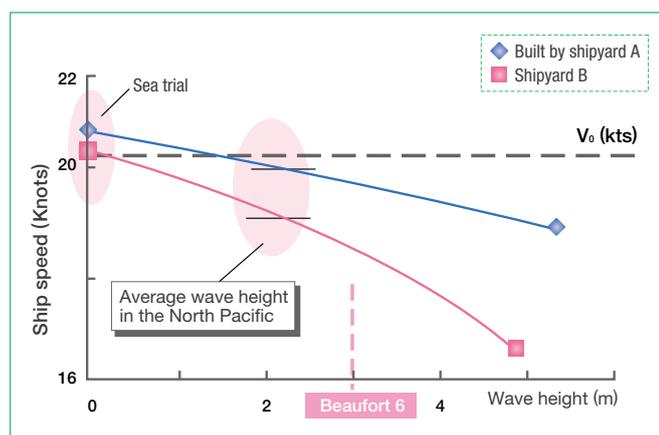


Fig. 4: Example of a ship IHM

Part I HAZARDOUS MATERIALS CONTAINED IN THE SHIP'S STRUCTURE AND EQUIPMENT

I-1 Paints and coating systems containing materials listed in Table A and Table B of appendix 1 of the guidelines

No.	Application of paint	Name of paint	Location	Materials (classification in appendix 1)	Approx. quantity	Remarks
1	Anti-drumming compound	Primer, xx Co., xx primer #300	Hull part	Lead	35.00 kg	
2	Anti-fouling	xx Co., xx coat #100	Underwater parts	TBT	120.00 kg	

I-2 Equipment and machinery containing materials listed in Table A and Table B of appendix 1 of the guidelines

No.	Name of equipment and machinery	Location	Materials (classification in appendix 1)	Parts where used	Approx. quantity	Remarks
1	Switch board	Engine control room	Cadmium	Housing coating	0.02 kg	
			Mercury	Heat gauge	<0.01 kg	less than 0.01kg
2	Diesel engine, xx Co., xx #150	Engine room	Cadmium	Bearing	0.02 kg	
3	Diesel engine, xx Co., xx #200	Engine room	Cadmium	Bearing	0.01 kg	Revised by XXX on Oct. XX, 2008
4	Diesel generator (x 3)	Engine room	Lead	Ingredient of copper compounds	0.01 kg	

tion in the ship recycling industry. These efforts resulted in the “The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009”, which was officially adopted in May 2009, and the convention is expected to enter into force over the next few years.

Among the most important components of the convention for the shipping and shipbuilding industry is the new requirement for ships to maintain an Inventory of Hazardous Materials (IHM) specifying the existence, location, and amount of potentially dangerous chemicals in the ship. For existing ships, this IHM will be developed by a third-party expert, but for newbuildings the IHM will have be created by the shipyard. Developing this inventory will

require shipyards to solicit Material Declaration (MD) forms from equipment and machinery manufacturers, and then develop the IHM based on this information. This is expected to greatly increase the paperwork required for newly built ships.

In order to help shipyards prepare for the enforcement of the Convention, ClassNK is already actively developing software to make the IHM development process an easier task for shipyards. The software will allow shipyards and manufacturers to exchange MD information electronically, and allow shipyards to easily complete IHMs by designating hazardous material locations. This new software, called PrimeShip-INVENTORY, is currently being tested at several shipyards within Japan and will be released worldwide in 2010.

Dhaka

Located in the northeastern part of South Asia, Bangladesh lays between the majestic Himalayas some distance to the north, and the Bay of Bengal to the south. The plains of west Bengal border the country on the west, and to the east lie the hilly and forested regions of Tripura, Mizoram (India) and Myanmar. These picturesque boundaries frame a low lying plain of about 147,570 km², criss-crossed by innumerable rivers and streams. This is Bangladesh, a fertile land where nature is bounteous.

Bangladesh is dominated by about 250 rivers, which flow essentially north-south. Some of the largest rivers are the Padma(Ganges), the Jamuna (Brahmaputra), the Meghna, and the Karnafuli. The Padma is the main distributary of the Ganges, which originates in the Himalayas, while and the Jamuna River is the main channel of the Brahmaputra river that flows from India into Bangladesh. The Padma, and the Jamuna, combine with the Meghna River to form the Ganges Delta, the world's largest delta and one of the most fertile regions on earth. The Meghna is the widest river that flows completely inside the boundaries of Bangladesh, and at one point near Bola the river grows wider than 12km.

As one might expect given the fertility of the land, Bangladesh's economy is characterized by a large agricultural sector, which employs roughly 85% of the country's population. The total cultivable area is



around 24 millions acres, and Bangladesh's major agricultural crops include rice, jute (the golden fiber), wheat, potato, pulses, sugarcane, tea, onion, garlic, ginger, and tobacco. As an agricultural nation, agricultural products and byproducts like tea, leather, ready made garments, and jute products are major exports.

However, Bangladesh is far more than just an agricultural nation. With a population of 145 million, Bangladesh is one of the most densely populated countries in the world. Roughly 86% of the population is Muslim, but Bangladesh also has large minorities of Hindus (10%), as well as Buddhists, Christians and others (4%). Inter-religious harmony and the strong population base have given rise to a growing service and industrial sector. These are in turn supported by a strong educational system boasting free primary education and more than 600 colleges, the majority associated with major universities.



A Maritime Nation

Despite its relatively young history (Bangladesh won its independence in 1971), Bangladesh has made major steps forward as maritime nation. The country boasts two major ports at Chittagong and Mongla, and is also one of the world's leading ship recycling nations.

More recently, the national government has given top priority to developing the shipbuilding industry, and the nation has already begun construction of newbuildings for foreign owners. Currently, Bangladesh's two major shipyards for newbuildings are Annand Shipyard and Slipway Ltd. and Western Marine Shipyard Ltd. in Chittagong. Annand Shipyard has already built two 2,900 dwt multipurpose cargo vessels for European



ClassNK Dhaka Staff



Dhaka's Sadarghat River Port

owners. Additionally, two other shipyards, Khan Brothers Shipbuilding Ltd. and High Speed Shipyards Ltd., are currently under development, and are expected to start newbuildings within the next one or two years. Chittagong also boasts a ship repair yard capable of docking vessels up to 26,000 dwt for repairs.

ClassNK Dhaka

ClassNK's relationship with Bangladesh reaches back nearly four decades. Following the liberation of Bangladesh in December 1971, the Government of Japan donated some sixteen NK classed vessels to the Government of the Peoples' Republic of Bangladesh as a token of friendship. The NK classed coastal oil tankers and general cargo vessels played an important role in the development of the newly established country.

Initially, surveys of these vessels were carried out by surveyors from the NK Singapore Office. However in 1974, ClassNK established an office in Dhaka to better serve the country's growing maritime sector.

At first the office was staffed by only a single surveyor, but as demand increased, a second surveyor was recruited. At present, the ClassNK Dhaka Office has two exclusive surveyors, two administrative staff, one accountant and one newly appointed technical staff member. Although initially designated a Sub-office, the Dhaka office was promoted to full office standing under the management of General Manager S. Islam in April 2009. The Dhaka Office covers surveys and audits at the ports of Chittagong and Mongla, and conducts docking surveys, primarily for coastal and inland tankers, at the Chittagong Dry Dock, Khulna Shipyard Ltd., and High Speed Shipyard Ltd.



Colorful rickshaws in Dhaka

Alexandria

Called the 'Pearl of the Mediterranean', Alexandria is Egypt's second largest city. Although geographically Middle Eastern, as an economic and cultural crossroads for thousands of years, Alexandria has an unmistakably Mediterranean atmosphere. Since its founding in 332 BC, the city has served as both an international metropolis and as an overlooked fishing village. Yet to this day Alexandria remains Egypt's busiest and most important port.

History and Development

Alexandria was founded by its namesake, Alexander the Great, King of Macedonia, in 332 BC. As the story goes, Alexander was struck by the excellent position offered by the nearby village of Rhakotis and the island of Pharos which sat across from it, and saw the potential to create a port for trade between Egypt and the rest of the world. It was that narrow strip of land, situated between the Mediterranean Sea to the north and Lake Marioutis to the south, that would become the city of Alexandria.

Following the collapse of Alexander's empire, Egypt fell under the rule of the Ptolemaic Dynasty until the rise of the Roman Empire. Following the defeat of Cleopatra, the Queen of Egypt and last of the Ptolemy's line, and the Roman leader Mark Antony, Egypt became a Roman province. During this period, Alexandria would grow to become one of the Empire's main ports, and



would be visited by numerous emperors including both Octavian and Hadrian.

It was also during this period that Alexandria came to be known as a Christian city. According to tradition, Christianity was introduced to Alexandria by St. Mark who came to Alexandria to preach the new religion in the middle of the first century. The Church of Alexandria played an important role in the religious councils held during the fourth and fifth centuries, and the city remained a Christian outpost until the 7th century.

In 642 AD, Muslim troops from Arabia captured the city and eventually all of Egypt. However, the Arabs moved the capital of Egypt from Alexandria to Cairo, and by the 1700s, Alexandria had shrank to the size of a small fishing village. Egypt remained under Arab rule until 1517, when it became a part of the Ottoman (Turkish) Empire. For more than two hundred years, Alexandria



Alexandria

would remain under Ottoman rulers before becoming a battleground between Turkish and European interests.

French troops led by Napoleon Bonaparte captured the city in 1798, only to be driven out by the British and Turks in 1801. After the French departed, Muhammad Ali, an officer in the Turkish army, seized control of Egypt. Under the rule of Ali and his successors, Alexandria regained its importance as a port city. Finally, in World War I and World War II, Alexandria served as the main British naval base in the Mediterranean. It was this rich history and constant interplay between native Egyptian and foreign rule that has given Alexandria the rich international atmosphere that it has become famous for.

Ports, Commerce and the Maritime Industry

Thanks to its prime location on the Mediterranean, long international history, and scenic beaches, Alexandria has emerged as a popular tourist and resort destination. However, there can be no doubt that Alexandria's greatest role is as a maritime city. Alexandria's ports, including Alexandria's Western Harbor, the El-Dekheila Port, Abu Quir Port, and the Sidi Kerir Tanker Terminal, account for over three quarters of Egypt's foreign trade. Although Alexandria's Eastern Harbor is too shallow for use by commercial shipping, the harbor is used by fishing boats and yachts and remains a popular vista, overlooked by Egyptian & Greek Yacht Clubs and the Qait Bay Fort.

Although not within the city's boundaries, it would be impossible to discuss the local maritime industry without also discussing the Suez Canal. The Canal was opened in 1869, and is considered to be one of the most important waterways in the world, as it is the fastest crossing from the Atlantic Ocean to the Indian Ocean. Unlike the Panama Canal, the Suez Canal has no locks, due to the similar water level at each end of the canal. Most of the Canal is limited to a single lane of traffic, but four bypasses (with a total length of 78km) are located along the Canal, allowing the transit of ships in both directions.

NK Alexandria Office

The NK Alexandria office originally began as the NK Cairo Office, which officially opened on May 15th, 1985. The Cairo Office was later moved to Alexandria on January 1st, 1987, to be closer to the Port and other maritime businesses. The first office in Alexandria proper was located at Manchia Square at the center of



NK Alexandria Team

the City, some four kilometers from Alexandria's main port, and close to the Ministry of Maritime Transport, the Egyptian Flag Administration and the main headquarters of local shipping companies. On Dec. 12th, 2008 the office was relocated to an excellent area at the border of the Smouha region which is conveniently located only five minutes from the main highway & Alexandria Airport, and is also directly connected to the Alexandria & Dekheila port, as well as the International Coastal Road which leads to Damietta, Port Said, a number of Suez Canal ports, and the ports & terminals along both sides of the Red Sea. The Alexandria Office oversees both Egypt and Libya, an incredibly large area with numerous survey ports & offshore terminals. In order to handle the growing number of surveys in Egypt and Libya, and to meet the challenges of surveying in the region, the office has expanded to a staff of six, including three Surveyors, two secretaries, one administrative staff and one driver.



Qait Bay Fort overlooking the Eastern Harbor

ClassNK

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