

ClassNK

MAGAZINE

October 2017 - 81st Edition

- ◆ *Practical steps to avoid bio-invasion*
- ◆ *Central role in cyber protection*
- ◆ *Fuel analysis*



Beyond compliance

Welcome to the 81st edition of the ClassNK Magazine



The maritime industry is leading the charge in compliance, and nowhere is this more apparent than in the introduction of new industry-wide regulations. In the face of significant challenges, the industry has come together to develop new technologies and solutions, many of which will come into practical use as regulations come into force.

Ballast water management has been a concern for the industry since it was discussed at the IMO's Marine Environment Protection Committee in the 1980s, but with the new Convention set to transform the current status-quo, it is vital that all stakeholders are well-informed. A piece on the implementation of the new ballast regulations is included in this edition as part of ClassNK's mission to support Ballast Water Management Convention compliance.

As with ballast, emissions are also an important environmental issue to be tackled. In this issue we have provided information on Exhaust Gas Cleaning Systems, and how they can be used to lower SOx emissions and keep in compliance with the looming 2020 regulations.

Cyber security is a recent but urgent concern for maritime industry. While no regulations are in place, industry players have been working to provide adequate guidelines to help organizations safeguard

against cyber-sabotage. An article on cyber security outlines the risks of non-compliance, and what organizations should do to ensure the integrity of their operations.

Another interesting topic is the new bunker fuel oil analysis service being provided by ClassNK Consulting Service. This optional service pools the expertise of international marine laboratories to ensure that shipping companies know just exactly what they are using.

And finally, an interview with ClassNK's Regional Manager of Europe and Africa, Mitsuhiko Kidogawa, offers insight into the activities in the region as well as the inner workings of the London Office.

I hope you enjoy this edition of the ClassNK Magazine.

A handwritten signature in black ink, appearing to read 'Mitsuhiko Kidogawa'.

ClassNK





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ClassNK

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ClassNKnews

ClassNK gives EU MRV support

31 May 2017 - ClassNK Consulting Service Co., Ltd launched a support service for setting up an EU MRV (Monitoring, Reporting and Verification of CO₂) Monitoring Plan (MP) in compliance with the EU MRV regulation. This regulation lays down rules for developing the MP and submitting the emissions report for ships above 5,000 gross tonnage arriving at, departing from, or sailing within ports under the jurisdiction of an EU member state, regardless of the ship's flag. An MP should stipulate the recording of a ship's operation data collection method and management procedure in line with the ship's current condition and a ship owner or an operator is to prepare and submit the MP to a Verifier for each of its ships. ClassNK Consulting Service now offers a support service for setting up an MP for EU MRV, including providing a standard form, guidance and necessary advice to set up an MP.

GBS verification for IACS CSR

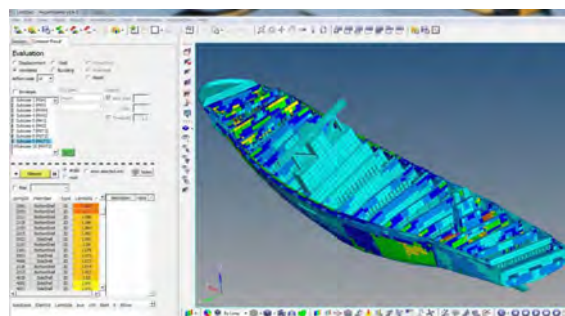
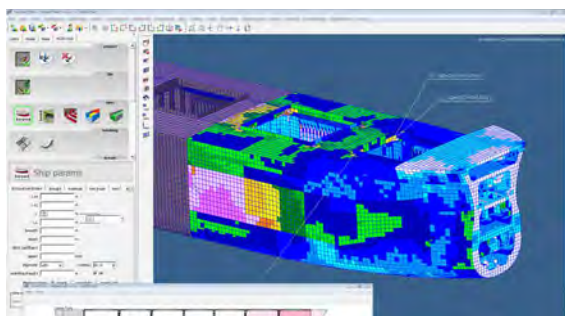
8 June 2017 – The IMO Maritime Safety Committee has confirmed completion of the corrective actions requested by IMO to the International Association of Classification Societies' (IACS) Common Structural Rules for Bulk Carriers and Oil Tankers (CSR BC&OT) at its 98th session on 7 June 2017. ClassNK welcomes the confirmation for CSR BC&OT made at MSC 98. As a member of IACS, ClassNK has extensively worked to complete the corrective actions in line with the IMO's requests as well as develop CSR BC&OT. On top of this, ClassNK has also supported the industry's compliance to CSR BC&OT with the world's first innovative CSR-BC&OT design support tool, PrimeShip-HULL(HCSR). The software was recently updated in February 2017 to incorporate the rule amendments which were implemented as the corrective actions.

PrimeShip-HULL(Rules) extended

16 June 2017 - ClassNK has released the new longitudinal strength assessments software "PrimeShip-HULL(Rules)/PartC15" as part of its prescriptive calculation suite "PrimeShip-HULL(Rules)". To ensure further safety and streamlining structural design of ships, ClassNK issued amendments for Chapter 15, Part C of its Rules for the Survey and Construction of Steel Ships relevant to the longitudinal strength in June 2017. The amendments included clearer standards for transverse members at the buckling strength assessments. In addition to the longitudinal strength assessment, "PrimeShip-HULL(Rules)/PartC15" assists improvements in the efficiency and quality of ship design by its function to model cross sections for any ship types applicable to Part C of ClassNK rules and produce the calculation result reports as Microsoft Word or Excel files. The information for use of "PrimeShip-HULL(Rules)/PartC15" is available at ClassNK website: www.classnk.com/hp/en/activities/primeship/

PrimeShip-HULL for Container Carriers

29 June 2017 - ClassNK has also released the latest version of its structural design support software for container carriers "PrimeShip-HULL for Container Carriers." "PrimeShip-HULL for Container Carriers" consists of prescriptive calculation software and direct strength assessment software, offering improvements in the quality and efficiency of ship design. The software enables designers to perform assessments for structural strength requirements such as yield strength and fatigue strength assessments as specified in ClassNK's Rules for the Survey and Construction of Steel Ships, in addition to longitudinal strength requirements specified in IACS Unified Requirements S11A. It also features a function to create a model of transverse members as well as longitudinal members, and a function to assess outside the cylindrical part of hull structure including the fore and aft part. The direct strength assessment software has an additional function for the torsional strength assessment of the hull.



ClassNK PrimeShip-HULL software



ClassNK has released its annual report on Port State Control

ClassNK and Green Award strengthen ties

3 July 2017 - ClassNK and Green Award announced that they would broaden their cooperation to ensure safety and minimize the negative effects of the shipping industry. ClassNK became a Green Award incentive provider. Current issues of concern for the shipping industry that are the focus of both organizations include the improvement of maritime security, the safety of seafarers and the reduction of ecological footprint; these concerns require industry-wide implementation of Corporate Social Responsibility principles. Stakeholders of the maritime industry need to continue to take steps to protect public health, the ocean and the environment. Green Award actively promotes and supports this idea, while ClassNK, dedicated to the safety and environmental pollution prevention, shares the goal. Jan Fransen of the Green Award Foundation, welcomed ClassNK's decision to become an incentive provider.

ClassNK reports on Port State Control

6 July 2017 - ClassNK has released its annual report on Port State Control. The report aims to assist ship operators and management companies in maintaining compliant operations by providing information about ships detained by PSC as well as deficiencies that were found on board. To help its customers improve safety management systems and overall fleet quality, ClassNK has included a breakdown of deficiencies which shows that fire safety-related deficiencies continue to be the most frequent detainable deficiencies item. The ClassNK report also provides detailed analyses on PSC detentions by flag state, port state, ship type, ship size, and ship's age as well as a summary of major amendments made to international conventions such as the SOLAS Convention. These amendments have further widened the scope of PSC inspections, a trend that will undoubtedly continue as the rules applied to ships increase and diversify.

First Turkish ship recycling compliance

12 July 2017 - ClassNK issued a Statement of Compliance (SoC) to a ship recycling facility in Izmir, Turkey, ISIKSAN SHIP RECYCLING and TRADING Co. Ltd. (Company Manager: Ömer DOĞAN). The statement verifies that the facilities are in line with the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (HKC). Although the HKC has yet to enter into force, ISIKSAN has carried out substantial improvements to its facility in a bid to offer safer and greener ship recycling, and has developed the Ship Recycling Facility Plan (SRFP) required for a competent authority's certification according to the HKC. ClassNK reviewed the SRFP prepared by ISIKSAN, verifying it as compliant with the requirements of the HKC, and confirmed that its ship recycling processes follow the SRFP in addition to conducting on-site inspections before issuing the SoC. This marks the first time a SoC has been issued to ship recycling facilities in Turkey.

ClassNK CMAXS for MOL pair

19 July 2017 – The ClassNK Consulting Service Co., Ltd diagnostic monitoring system “ClassNK CMAXS” has been chosen by Mitsui O.S.K. Lines (MOL) for installation on two more ships, extending the owner's use of the next generation solution to six vessels. The two ships are installed with CMAXS e-GICSX, a system which monitors electrically controlled main engine supplied by Mitsui Engineering & Shipbuilding Co., Ltd., and CMAXS LC-A for auxiliary engines supplied by DAIHATSU DIESEL MFG. CO, LTD. Both CMAXS systems operate simultaneously, gathering information from VDR, data logger and main engine. This information is consolidated on a common platform for analysis and potential future improvement. The common platform also allows the user to clarify results of machinery diagnostics and troubleshooting using a common interface. A support service is also available for shipping companies and crew through the CMAXS Web Service.

ClassNKnews

ClassNK Singapore celebrates 50 years

19 July 2017 - ClassNK hosted an anniversary party to commemorate 50 years of its Singapore Office on 18 July 2017. ClassNK's Singapore Office was established in 1967 to strengthen its service network in Southeast Asia and cover surveys at ports around the region as well as to support its clients. Speaking on the occasion, Chairman and President Koichi Fujiwara said: "I am truly honored that ClassNK Singapore has been able to share this history of growth with Singapore and Singaporeans for these past 50 years. At the same time, I sincerely appreciate the support and cooperation of the maritime community here." ClassNK's Singapore Office continues to serve the maritime industry in Southeast Asia in order to meet its clients' requests and provide timely and high quality services.

EU MRV for Iino Marine

2 August 2017 - ClassNK issued an approval certification to Iino Marine Service Co., Ltd. on successful assessment of an EU MRV Monitoring Plan for its chemical tanker "CHEMROAD WING" as an EU MRV verifier on 28 July. The issuance of this approval certification is a first for ClassNK. ClassNK acquired approval from UK-based national accreditation body UKAS in March 2017 as an EU MRV verifier. ClassNK issued approval certification to Iino Marine Service Co., Ltd. for "CHEMROAD WING" for fulfilling the necessary criteria stipulated in EU MRV regulations. The Monitoring Plan submitted states data collection methods for fuel consumption, distance travelled, time spent at sea, amount of cargo carried, as well as methods to be used to treat data gaps.

e-Certificate gets flag state approval

6 September 2017 - ClassNK has expanded the scope of the world's first comprehensive electronic certificate service for classification and statutory certificates to include the flag states of Panama, Singapore, and the Marshall Islands from 15 September 2017. The service, ClassNK e-Certificate, which is currently available to Liberian-flagged vessels, will be available to ClassNK-registered vessels from the four flag states that account for approximately 60% of vessels on the ClassNK register. ClassNK e-Certificate became the world's first electronic certificate service for classification and statutory certificates on 15 June 2017, after the Liberian Registry confirmed that it meets the requirements of the IMO Guidelines and granted ClassNK authorization as the first Recognized Organization to issue electronic certificates to Liberian-flagged vessels on its behalf.

ClassNK lays out R&D Roadmap

25 September 2017 - ClassNK has released its R&D Roadmap, detailing its vision and goals for projects over the next five years. The R&D Roadmap outlines the two activities as the foundation of ClassNK R&D, and details the investigations and research which will contribute to the development of human resources supporting maritime technology and engineering, and contribute to damage prevention. ClassNK will carry out R&D in the mid-long term on the four focus areas of "Rule Development", "Survey Technology Innovation", "Marine Environmental Protection" and "Revolutionary Technology Development". ClassNK will collaborate with universities, research institutions, and the industry to execute the R&D Roadmap together with contributions from further development of human resources.

ClassNK Singapore celebrates 50th anniversary



Practical steps to avoid bio-invasion

ClassNK helps shipowners prepare to meet ballast water regulations

Now that the Ballast Water Management Convention has formally entered into force, shipowners must focus efforts on the practicalities of implementation to halt the spread of invasive aquatic species.

The BWM Convention was adopted by IMO in 2004 with the aim of preventing the transfer by ballast water of invasive aquatic organisms from their natural home to new habitats thousands of miles away, where they can disrupt the balance of delicate marine ecosystems. Researchers believe that such bio-invasions can indirectly impact on economic activity and carry implications for human health.

On 8 September 2016, Finland acceded to the Convention, bringing

the contracting states to 52 and the combined tonnage of States to 35.14%, satisfying the necessary conditions to trigger entry into force one year later, on 8 September 2017.

The Convention requires all ships carrying ballast water to install ballast water treatment systems, which satisfy relevant ballast water exchange standards, carry approved ballast water management plans, and maintain ballast water record books.

In July of this year, IMO's 71st Marine Environmental Protection Committee (MEPC) agreed a new timetable for the implementation of the Convention, bowing to pressure from organizations repre-

senting the shipping industry. The amended timetable grants shipowners an additional two-years to prepare themselves to meet the Convention's requirements including, in particular, the installation of an approved ballast water treatment system. It should be noted that the US is pressing ahead with enforcing its own rules.

The timetable for newbuilds with keel laid after the Convention's entry into force is unchanged. They must install a system before delivery. Existing vessels without an IOPP Certificate must install by 8 September 2024. Existing vessels that renewed their IOPP certificate in the three years prior to the Convention's entry into force (i.e., after 8 September 2017) must in-



stall by the next IOPP renewal survey. Existing tonnage that falls into neither of the above categories has until the second IOPP renewal survey or until the IOPP survey after 8 September 2019, whichever comes first.

To help shipowners prepare to meet the Convention's requirements, ClassNK has released a new set of technical rules and guidance for shipowners concerning the installation of BWMS. The revised rules draw upon the knowledge of ClassNK's in-house experts as well as incorporating guidance from the International Association of Classification Societies, and satisfying Japanese domestic law.

It is important shipowners now focus on the operational and installation aspects of the ballast water management systems to ensure successful implementation and compliance with the regulations. Under the Convention owners must develop ballast water management plans (BWMP) for individual ships, the maintenance of appropriate records and compliance with concentration-based discharge limits as determined by the vessel's date of construction and ballast water capacity.

The Convention incorporates two standards. The D-1 standard covers mid-ocean ballast water exchange as an interim measure until ships are ready to meet the D-2 standard, which sets the performance benchmark for treatment systems. Following entry into force, all newbuilds have to meet the D-2 standard on delivery. For existing tonnage, the applicability of the D-2 standard is determined by a vessel's IOPP renewal date.

Current options for treating ballast water include mechanical treatment (i.e., filtration, destruction), physical treatment (i.e., ultraviolet light, heat or deoxygenation), chemical and/or electrochemical treatment, or combinations thereof. In some cases, discharge of bal-

last water into approved reception facilities may be possible.

The BWMP should provide a detailed description of the actions and safety procedures needed to comply with the Convention. It also specifies the officer on board in charge of ensuring that these processes are followed. Preferably, it incorporates plans and drawings of equipment systems and information on sampling points and procedures, as well as recording requirements and crew training. Port State Control Officers may request to review the plan to verify compliance.

By clarifying technical details such as appropriate start-up and shut-down processes for treatment systems, back-flushing rates in filtra-

To help shipowners prepare to meet the Convention's requirements, ClassNK has released a new set of technical rules and guidance for shipowners



tion-based equipment, restocking schedules and handling advice for consumables etc, a well-organised BWMP ought to prevent issues during ballast water operations. To ensure BWMP is properly implemented, administered and executed it is vital that officers and crew are familiar with their required duties. In addition to training on the general aspects of BWM, they should receive instruction on ship-specific operational procedures.

Details of when and where ballast water is taken aboard, treated, discharged into the sea (or reception facility) must be logged in the ballast water record book. Accidental discharges and other exceptions must also be documented.

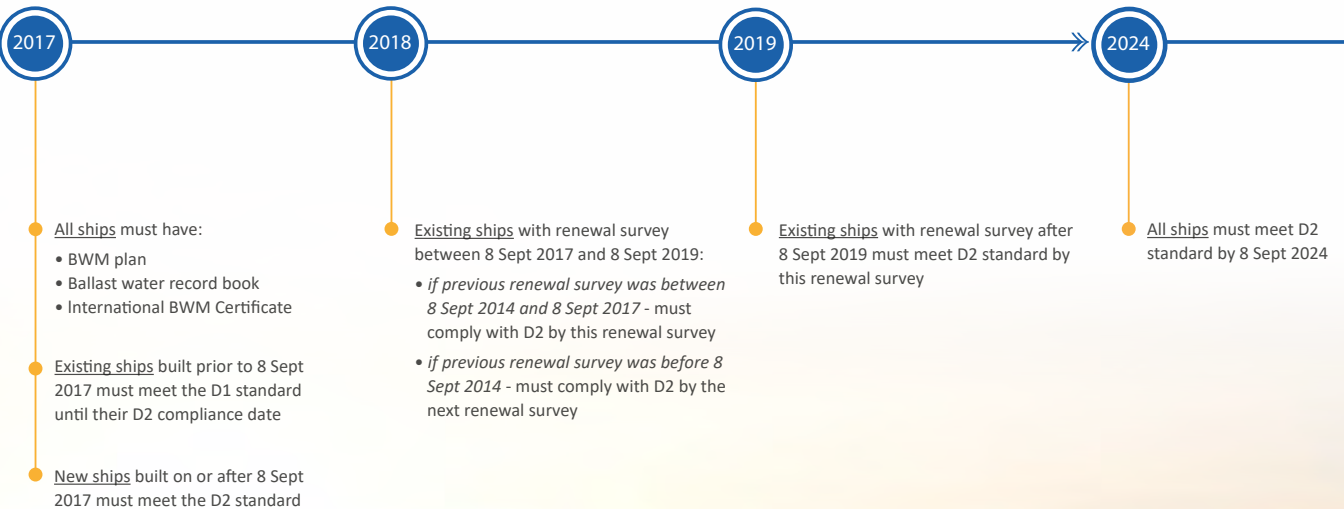
Treatment system manufacturers have recognised this requirement and incorporated automated data logging in their equipment. However, shipowners are recommended to periodically confirm that this is functioning correctly and that the data is retrieved and stored securely in case requested by Port State Control. It is also worthwhile auditing data internally as it can be helpful for monitoring equipment performance and detecting potential issues before they escalate.

These records may additionally aid the preparation of maintenance activities. Bringing together different service engineers once a year to check critical components, perform software updates, and other tasks

is regarded as a particularly effective strategy.

Moreover, it is an opportunity to refresh crew's knowledge of operation, troubleshooting and emergency procedures as a way for shipowners to fulfil their obligation under the Convention to ensure that their personnel have the necessary competencies to carry out their ballast water management duties and functions.

Ideally, details of the training and familiarization regime should be outlined in the shipowner's Safety Management System, together with a framework for managing any risks, particularly, if the treatment system uses chemicals or other active substances.





Central role in cyber protection

Class will and should be central in responding to cybercrime

The 'NotPetya' malware attack on a shipping line's systems earlier this year saw the IT systems in shipping terminals all over the world locked, with the problem taking two weeks to resolve. Some sources have estimated that the attack could have cost up to US\$300 million.

The incident unnerved the entire maritime industry, adding urgency to its growing awareness that there will be no quick fix for cybercrime. However, the abiding lesson of the Not-Petya episode comes from the fact that the malware was not targeting maritime; it was traced to compromised widely-used tax-accounting software and hit around 7,000 companies globally via un-patched Microsoft Windows operating systems. Shipping, like other industries, sim-

ply proved unable to protect itself against the indiscriminate cyberattacks that routinely target industrial control systems. IBM estimates that such attacks increased by more than 110 percent worldwide in 2016.

Windows XP – an operating system Microsoft no longer supports – is still used widely in shipping, making the industry particularly vulnerable to relatively unsophisticated attacks, especially where these systems now have greater bandwidth over which to communicate.

For ships at sea the operating systems under attack can include those managing the bridge, cargo handling, power control, propulsion and machinery, communication systems themselves, as well as passenger-fac-

ing public networks, admin and crew welfare systems. Many of these are critical systems and are vulnerable to online cyber criminals seeking to hack into random IP addresses, but also to the multiplying number of devices brought on board by seafarers and to infected USB sticks. Threats can also be the unintended consequences of benign actions, such as software maintenance.

Effective cyber risk management therefore needs to consider not only a fast-moving technical threat where security is constantly playing 'catch-up', but the procedures and the security culture within an organization.

Through a collaborative project with the United States Maritime Resource Center, the Liberian Reg-

*Class should develop
auditing standards based on
real research, to effectively assist
the industry with a transformation
of its culture and awareness*

istry and BIMCO to identify real threats posed from cyberattacks, ClassNK has concluded that ships are effectively vulnerable to the same risks as computer networks ashore: day-to-day practices are the most common source for the introduction of malware. For this reason, ClassNK welcomes the IMO's Maritime Safety Committee approval of new Guidelines on maritime cyber risk management in June; while voluntary, they effectively require ship owners and managers to incorporate cyber risk management into their (ISM code) safety management systems by 2021.

The accommodation shows IMO identifying shipping's need to protect itself against threats and vulnerabilities related to digitization, integration and automation of processes as a cultural, rather than technical requirement. In general, cyber security is understood to be an organizational culture that allows technologies to succeed; not a technological solution that results in organizational success.

The belief that procedural change, training and vigilance are cornerstones to greater cyber security runs through the second edition of BIMCO's "Guidelines on Cyber Security Onboard Ships" to improve resilience and integrity of cyber systems onboard. It is also understood to frame the draft "Guidelines for Addressing Cyber Risks at Maritime Transportation Security Act (MTSA) Regulated Facilities" from the U.S. Coast Guard (USCG), announced in July.

Incorporating cyber risk management into safety management systems sees IMO devolving responsibility to Member Government and Flag Administration requirements, which in turn puts Class at the centre of developing, training for and upholding cyber security standards.

It is no coincidence that Inmarsat's Fleet Secure – the first fully-managed Unified Threat Management (UTM) and monitoring service for ships – includes a cultural as well as technical dimension. While highlighting the malware filtering and virus blocking capabilities developed by Trustwave, Inmarsat has focused on the network integrity, operational and training support, and raised awareness that the service will cultivate.

A joint working group set up by the International Association of Classification Societies (IACS) seeks to formulate a robust set of recommendations for cyber security at sea. IACS' aim is to provide a forum for industry groups with an interest in the production, use and operation of cyber systems, including the International Union of Marine Insurance. An 'IACS cyber panel' within the JWG will develop class recommendations on cyber risks, with a view to making these risks insurable.

In general, cyber risk management can only succeed if senior management commitment within a shipping organization extends to identifying responsibilities and putting the pro-

cedures, feedback mechanisms and contingency planning in place.

Ultimately, any shipping organization wants to be able to protect itself against a cyber-event and ensure continuity of shipping operations: this implies the organization has the ability to detect, respond to and recover from an event. The cyber risk management process will provide an assessment of functional elements to establish the current situation and the desired situation across critical systems and offer recommendations covering how to move from one position to the other. It would not set out specific technical or construction standards for ship systems, but instead provides a management framework that can be used to reduce the risk of cyber incidents that could affect the safety or security of the ship, its crew, passengers or cargo.

As noted, ClassNK's work towards the development of robust cyber security standards has seen it collaborating with independent non-profit organization USMRC. Part of this work relates to USMRC's globally recognized Maritime Cyber AssuranceSM research, and plans to integrate maritime cyber assurance best practices into the new ClassNK Ship Data Center.

More broadly, ClassNK firmly believes that classification should be driving the implementation of maritime cyber assurance standards for equipment, software, integrated industrial control systems and the users interfacing with maritime systems. Implementation of these standards will serve not only to protect big data usage but also contribute to supporting the uninterrupted operation of marine engineering, cargo management and navigation functions.

Most importantly, Class should develop auditing standards, or "train the cyber auditor", based on real research, to effectively assist the industry with a transformation of its culture and awareness.



First-class service across Europe

Interview: Mitsuhiro Kidogawa, Regional Manager of Europe and Africa, ClassNK London

Could you offer background on yourself?

I joined ClassNK shortly after graduating from Kyushu University with a degree in naval architecture in 1984. I spent my first seven years in the ClassNK Hull Department until transferring to a branch office in Western Japan for two years. I worked at our Hamburg Office in 1997 for five years, before returning to Head Office in Japan, where I served in a number of roles including Manager of the Survey Department and later General Manager of the Hull Department. Part of my role in the Society also included overseeing ClassNK's joint projects with the Finnish software house NAPA, such as the operational support software ClassNK-NAPA GREEN.

In my new position as Regional Manager of Europe and Africa, I hope to

use the experience I have gained from working in classification over the past 30 years.

What are the main services provided by the London Office? Who is responsible for these activities?

The London Office provides Classification Surveys, Safety Management System Audits for Companies and vessels (ISM) Ships Security Audits (ISPS), Maritime Labour Inspections (MLC), Ship's Security Plan Approval, MLC Reviews, and Certification of Quality Management System for ISO 9001.

We have a team of seven (7) highly experienced surveyors and auditors. I oversee the day-to-day operations of our regional service network, while being responsible for implementing ClassNK's long term strategy in the region.



Mr. Kidogawa, ClassNK London

How many clients does the London Office work directly with? What is the geographical scope of activities?

We work directly with 30 clients in the London territory alone. Our wider service network comprises of 29



offices located across 17 countries, including Norway, Germany and the Netherlands, as well as three offices located in the UK.

Our subsidiary NKK(UK) Ltd. was established to offer third-party elective services, and was accredited by UKAS for ISO9001 in the middle of 2016. While not under jurisdiction of the ClassNK London Office, NKK(UK) Ltd. works closely with the maritime community here and abroad, offering certification services to clients not just in the UK but around the world.

What are the current objectives for the London Office? How do you measure your success?

Our clients are our number one priority. Since the establishment of the London Office in 1962, we have had a long history of cooperation with the maritime community providing our classification services and technical advice in a timely and accurate manner. In order to do this, we have several objectives we aim to fulfill. For instance, we are striving to further develop our certification service in line with MED (Marine Equipment Directive) and EU MRV (Monitoring, Reporting, Verification) regulations to make it easier

for clients to keep up and follow the latest requirements.

Through enhancing media coverage and working together with Japanese organizations in Europe, we aim to help strengthen the brand image of the Society. In addition, we are striving to improve technical capacities and expand services through working together with technology firms in Europe, as well as service improvements across our network to further acquire class registrations.

To a large extent, this objective remains unchanged. However, with the introduction of new regulations presenting new challenges to owners and operators, we feel it is our responsibility to work together with industry and the support of our Head Office in Tokyo to proactively develop and provide the right solutions.

For us, success is measured by the feedback from our clients, and how we manage to incorporate their needs into our service.

Do you think Brexit will have an impact on the activities of ClassNK in Europe?

Over our five decades operating in London, our links to the community

here have become stronger than ever. London hosts a wide variety of international meetings; the International Maritime Organization (IMO) playing a central role. In addition, as the city continues to hold a central position in shipping finance, it is believed that the effect of Brexit on our shipping industry will be relatively limited compared to other industries.

However, at this moment, Brexit is still an ongoing process, and it is difficult to make any serious predictions with a high amount of certainty. What remains is that we have a strong service network in the EU and throughout greater Europe, which will still be in place to serve our clients in the region.

What is most important to the London Office?

The most important objective for the London Office is to provide our clients with what they need, when they need it. That requires preparation as well as flexibility. With Survey Department representatives located in the London Office and the Hamburg Office, we have the same final decision-making authority as Head Office, enabling us to offer the same high quality services directly here in Europe.

Exhaustive guidelines for gas cleaning

New ClassNK Guidelines on Exhaust Gas Cleaning draw on cutting edge installations

Revised Guidelines for Exhaust Gas Cleaning Systems (EGCS) from ClassNK offer unique insights into the work the Japanese society has been doing to ensure that owners, shipbuilders, manufacturers etc. are prepared for the 'SOx scrubber' by 2020.

The reduction of SOx and PM emissions from ships envisaged under MARPOL Annex VI from January 1, 2020 mean that shipping will have to choose between fuels with sulfur contents of 0.5%, alternative fuels such as LNG etc. or invest in the EGCS which allow them to continue using higher sulfur grade fuels.

To some degree, this choice has been clear for more than a decade, after the equivalence of EGCS was recognized in the initial limitations placed on marine fuel sulfur content by EU Directive. Accordingly, the evolution of EGCS of different types has been integral to several longstanding ClassNK joint research projects, based on requests from the maritime industry. SOx scrubbers remove around 98% of sulfur contained in exhaust gas by desulfurizing fuel oil.

However, while one industry 'crunch point' came after entry into force of SOx Emissions Control Areas, limiting fuel sulfur content to 0.1% from January 1, 2015, restrictions were largely limited in their impact to shortsea ships, operating within specific regions. Therefore, it has been IMO's agreement to make 2020 (rather than 2025) the date for the 0.5% global sulfur cap enforcement that has finally brought most of shipping to the crossroads on choosing between low sulfur fuels, alternative fuels or the EGCS.

Clearly, owners need to consider a number of factors when assessing whether to commit all or only some of their ships to EGCS. As ClassNK's latest guidelines also explain, however, the technical work for SOx scrubbers does not end there. This is why the new ClassNK Guidelines include standards for EGCS installation based on actual ships and design trials and, in the case of existing ships, offer guidance on how to obtain notations for full readiness for EGCS installation.

In general, owners will have to decide whether they should invest in

systems operating on 'open-loop' or 'closed loop' principles, or opt for a hybrid technology. In addition, even should an investment in EGCS appear compelling at the outset, installation onboard existing vessels is by no means straightforward.

Open loop systems use seawater as the 'washing' medium sprayed over the exhaust gas, which means that the system's ability to scrub the exhaust depends on its alkalinity to neutralize sulfur oxides. Here, the waste stream is discharged into the sea.

In the closed loop approach, the exhaust gas washing is generally performed with the wash-water treated with additives that increase its alkalinity then re-circulated into the scrubber, with more wash-water and/or alkalinity added to maintain efficiency levels. This system can operate without wash-water discharge.

For ships operating routes/areas where the seawater has variable alkalinity and/or the wash-water discharge is prohibited, the safe option would be to choose a hybrid

scrubber that can switch between the open loop and closed loop modes.

For owners, the main determinant in this choice will therefore be the vessel's operating route, although system costs will also be material. Each option will have different costs in terms of overall systems (pumps, tanks, dosing equipment, etc.), installation, power consumption by pumps, the use of additives and maintenance.

Part of the work contributing to ClassNK's revised EGCS Guidelines has been its close involvement in the 'Hybrid SOx Scrubber System' project, developed through the cooperation between Kawasaki Kisen Kaisha, Ltd., Mitsubishi Heavy Industries, Ltd. and Mitsubishi Kakoki Kaisha, Ltd.

Supported through ClassNK's Joint R&D for Industry program, this distinct market solution has been approved as fully compliant with ECAs and the 0.5% global sulfur cap as enabling stable cleaning that is unaffected by the properties of the seawater in the area of navigation.

Verification testing onboard the "K" Line *Drive Green Highway 'Eco-Ship'* – a car carrier with capacity for 7,500 units delivered at the start of 2016 – resulted in ClassNK formal approval of the EGCS system by flag state Panama at the beginning of 2017 as IMO compliant.

The Hybrid SOx Scrubber System is distinctive in that its core components can be housed within an ISO

ClassNK's work on EGCS is also proving ground-breaking for other vessel types

shipping container, for installation on the open deck. As well as saving engine room space and installation time, the configuration makes the package a good candidate for retrofitting on older ships, and relatively easy to transfer between vessels.

Retrofitting SOx scrubbers means installing equipment in the engine and in the ship's funnel – in spaces that were not originally designed to accommodate it. Another one of the interesting projects contributing to the revised guidelines from ClassNK also involved car carriers, and helped to develop ClassNK's new 'EGCSR-F' (EGCS – fully ready) notation, indicating that ships fulfill requirements for SOx scrubber retrofitting. This notation was conferred on nine existing Pure Car Carriers operated by Mitsui O.S.K. Lines at the start of 2017, in a project also involving Minaminippon Shipbuilding Co., Sanwa Dock Co., and Wärtsilä Japan.

In the first phase of the project, ClassNK undertook extensive work to compile the safety requirements for retrofitting, also using the latest

technologies such as 3D scanning to promote operational efficiency in the installation process. Based on ClassNK's appraisal, all nine ships received a class notation of classification character EGCSR-F), which certifies preparation for installation of SOx scrubber systems retrofit plan fully complies with corresponding class and statutory requirements.

ClassNK's work on EGCS is also proving ground-breaking for other vessel types. As the world's largest class society serving dry bulk carriers, for example, its joint R&D effort with Imabari Shipbuilding Co. has proved market-leading.

The '*Main Engine Exhaust Gas Cleaning System (EGCS) installation on operating newbuilding vessel, and practicing test*', saw the Fuji Electric Hybrid SOx scrubber installed onto the 84,000 dwt bulk carrier *Nadeshiko*. The SOx scrubber adopted the 'cyclone method', where a highly diffused spray of wash-water increases contact between exhaust gases and liquid droplets, removing SOx by absorption.





Fuel analysis

Regular fuel analysis is essential to prevent engine failure

Bunker fuel oil taken on at one port is not always consistent with that loaded at another, although the difference will be hard to spot from appearances. In fact, the hidden variations in the chemical composition of fuel can have ramifications for the reliability and longevity of engine components and other machinery systems. In some cases, they can lead to catastrophic engine failure.

Ship owners and operators need effective methods to assess and evaluate the impact of these qualitative differences and a new testing service from ClassNK Consulting Service Co., Ltd. (also known as NKCS) is bringing fresh clarity to the preventative measures that ensure safe vessel operations and minimise unnecessary downtime.

The ClassNKCS bunker analysis service is offered through laboratories located in the strategic maritime hubs of Singapore, UAE, UK and Houston, TX, USA through its subsidiary NKCS. At its most basic level, within 48-hours of receipt, fuel samples are analysed according to the

requirements of the internationally recognised ISO 8217 standard. A report of the findings together with advisory actions to ensure safe operation is then provided to the ship owner/operator.

In more complicated cases, the laboratories are equipped to measure the fuel's asphaltene content; determine its total acid number (TAN); analyse its combustion; and investigate its composition at a molecular level using sophisticated spectroscopic techniques.

Close monitoring and reliable analysis have become even more critical as emissions rules have brought new variables to the fuel quality mix. A longstanding source of engine breakdowns are the catalytic fines (commonly known as cat fines) which accumulate in fuel tanks and enter the fuel system during operation. These particles of spent aluminium and silicon catalyst, which find their way into the fuel at the oil refinery, vary both in size and hardness. They can sometimes be equal in hardness to corundum or quartz,

both of which are commonly used as grinding and polishing materials, so understandably even small amounts can be damaging to the internal workings of complex machinery.

Once inside the engine, they can cause abrasive damage to engine cylinder liners during the combustion process, when they get trapped between sliding surfaces such as the piston ring and cylinder liner, or the piston ring and ring groove. Fuel pumps and injectors are also susceptible to damage. Because cat fines can wear the engine fast, major engine manufacturers recommend the use of fuel purification systems to clean the fuel and remove cat fines before they reach the engine.

However, the problem has resurfaced after international legislation requiring the use of fuels with a limited sulphur content. The current global average for low sulphur fuel is more than 30 ppm – a level which increases the danger of cat fines settling and accumulating in the bunker and settling tanks.

It is worth noting that the ISO 8217 specification has been updated three times since it was first established in 2005. The 2010 specification introduced stricter requirements on several fuel parameters, and reduced the maximum permissible level of cat fines from 80 ppm to 60 ppm.

NKCS's bunker analysis service is compatible with all editions of the ISO standard, including the latest ISO 8217:2017 specification, which adds a new class of distillates allowing for bio-fuel blends; introduces further cold flow checks for distillate fuels; and brings a change of the scope to allow for inclusion of hydrocarbons from synthetic or renewable sources.

Furthermore, there is a divergence between the maximum acceptable levels of cat fines as stated in common marine fuel specifications – primarily ISO 8217 – and those recommended by engine manufacturers, which are typically 10-15 ppm.

A survey by a major fuel supplier recently found that more than two in five vessels have potential issues with cat fines. This would indicate

that the scale of the problem is much larger than previously thought. It is suggested that the pervasiveness of cat fines is not wholly due to individual batches of fuel, but because these impurities settle out in ship's fuel tanks over time. Then, when the ship goes through rolling conditions or bad weather, this accumulation is disturbed and mixed back into the fuel that is fed to the engine. In some cases, the concentration of cat fines in the agitated fuel can exceed the level that the fuel purification system is designed to handle.

Taking fuel samples from the upper, middle, lower and bottom of the relevant bunker tank will not only reveal the presence of cat fines but also help establish their distribution in the tank. It is also good practice to check the performance of the fuel purification system periodically by taking and comparing samples from the system inlet and outlet respectively. Purifiers should be opened for cleaning at the scheduled intervals recommended by the manufacturers, or more often if poor fuel quality is suspected. It is recommended vessels maintain the necessary spare parts on board.

Statistics on fuels tested at bunkering ports over the past two years show that almost one in six of residual fuels exceed the standards specification for at least one test parameter, whilst around one in ten of samples of distillate fuels tested exceed their specification for at least one parameter. For residual fuels, off-spec density, high cat-fines and above average sediment levels were found, by rank, to be the most commonly identified irregularities. This translates into a considerable risk for vessels not testing their fuel regularly.

It should be noted that problematic fuel is not confined to certain ports or geographic regions; short-term issues can hit at any time in any location. Therefore, NKCS recommends regular fuel analysis, in combination with appropriate procedures for fuel system monitoring and training for crew as essential if unexpected machinery failure and downtime is to be avoided. Frequent analysis can contribute to reduced engine wear and extend times between overhaul, which translates to cost savings and increased availability.

*The ClassNK
bunker analysis
service is
offered through
laboratories
located in the
strategic maritime
hubs of Singapore
and Houston*





Relaxing in the southern seas

White sand, blue skies, and green palms welcome visitors to Okinawa

Located about 2,000km southwest of Tokyo, Okinawa is renowned across the world for its beautiful beaches and relaxed island atmosphere. Naha, the capital city of the chain of islands, welcomes over seven million sun-seeking tourists each year from both within Japan and abroad.

The high-rise buildings and busy highways of Tokyo are nowhere to be seen, replaced by souvenir shops as well as restaurants and bars offering both international cuisine and local fare to suit the tastes of all visitors. No place represents this better than *Kokusai-dori*, known in English as 'International Street', the capital's main thoroughfare. A walk down this 2km stretch of road gives just a taste of what Okinawa has in store.

The island way of life runs strong within the community, and their identity as *shimanchu*, or islanders, is part of their unique culture. Once the Kingdom of Ryuku, Okinawa bears influences from both mainland Japan and China, alongside its

own traditions. Japanese is local language, but the ancient Ryukyu dialect still runs strong, adorning menus and tourist information – but thankfully with ample translations for the domestic and international tourist.

Shuri Castle offers insight into the culture and history of Okinawa. Like most dwellings on the island, the castle is guarded by two stone dog-like creatures known as *shiisaa*, protecting inhabitants from evil spirits. The sprawling hill-top structure is a balance of vibrantly colorful Okinawan architecture and traditional Japanese tatami interiors. A museum located within the grounds touches on ancient diplomatic ties with China, the Japanification of the island, and the more modern influences that permeate the area.

The most recent influences on the culture, notably from America, can be seen in the cuisine. While seafood is a common staple, spam- and taco-inspired meals are ubiquitous menu items, and steak houses can

be seen on every street. Restaurant patrons can regularly be seen ordering the local *goya champloo* (a stir-fry dish of tofu, bitter melon, and bonito flakes) alongside fried spam and scrambled eggs. As with all foreign influences the island has seen over the years, they have been absorbed into the local customs rather than changing the island's culture.

While the unique cuisine and history of Okinawa offer ample reason to visit the area, the main destination for tourists is arguably the beaches. Smaller islands dotted around Naha are home to some of the clearest waters in the world. Naha port offers boat trips to the local islands such as nearby Tokashiki Island for those wishing to check out some of Okinawa's more secluded beaches.

With little more than white sand, blue skies, and green palms, these beaches are nature at its best. Whether watching tropical fish swim by, or floating in the cobalt blue sea, there is perhaps no better place to relax than an Okinawan beach.

ClassNK events:

- ◆ **KORMARINE, BUSAN, KOREA, 24TH - 27TH OCTOBER**
Please visit ClassNK at booth 5Q-04
- ◆ **MARINTEC CHINA, SHANGHAI, CHINA, 5TH - 8TH DECEMBER**
Please visit ClassNK at booth N1D31-12
- ◆ **ASIA PACIFIC MARITIME, SINGAPORE, 14TH - 16TH MARCH**
Please visit ClassNK at booth B-L16
- ◆ **OTC ASIA, KUALA LUMPUR, MALAYSIA, 20TH - 23RD MARCH**
Please visit ClassNK at booth C621

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