

# ClassNK

## MAGAZINE

*May 2017 - 80<sup>th</sup> Edition*

- ◆ *2020 vision*
- ◆ *Going digital*
- ◆ *MST keeps an open mind*





# Staying the course

Welcome to the 80<sup>th</sup> edition of the ClassNK Magazine



The maritime industry has seen many changes over its long history, drastically transforming how things are done. The changes we are seeing today are no less influential. Spurred by the development of new technologies, change is in fact a constant for our industry. Adaptability has been the key to our success. Of course supporting the development of these technologies is part of the ClassNK mission, ensuring the safety of our classed fleet during these changes is our primary objective.

The development of rational rules and guidelines together with communication with all sectors of the industry is essential in achieving our dual mission. When something new comes along, we must have the proper framework already in place to enable a safe and smooth transition into each new phase. Through the articles of this magazine, you can see part of our efforts on this front.

One new development that is expected to have a major impact not just on the maritime industry, but the world itself, is the use of liquefied hydrogen as a fuel. Harnessing the power of this ubiquitous fuel source would see GHG emissions virtually eliminated from our skies. An article on liquefied hydrogen introduces the latest activities in the industry as well as ClassNK's recent guidelines on the subject.

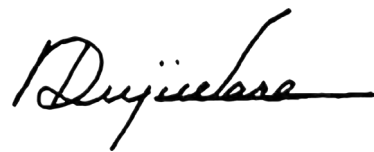
The big data revolution is another technological advancement that brings with it a wealth of opportunities. However, in order to implement big data across the industry, there are a number of significant hurdles

that must be overcome. ClassNK's role in stakeholder initiatives to realize a safe and secure Internet of Things in the shipping world are also included in this edition.

As always, our clients are our priority, and we are honored to have an interview with Mr. Matthias Ruttmann, Managing Director of German shipping company MST Mineralien Schifffahrt Spedition und Transport GmbH in this edition. This interview gives great insight into the workings of a world-renowned European shipowner.

Another hot topic in the industry is the upcoming SOx regulations. This edition includes an overview of the incoming requirements and details what measures can be taken to stay in compliance in the face of the new challenges.

I hope you enjoy this edition of the ClassNK Magazine.



# ClassNK





- 2 Moving forward**  
Welcome to the 80<sup>th</sup> edition
- 4 ClassNK news**  
ClassNK continues to set the industry agenda
- 6 2020 vision**  
ClassNK finds ways to address the impending SOx regulations
- 8 ClassNK takes lead on e-certification**  
E-certification lifts the paperwork burden and is a tool to fight fraud
- 10 Enabling EU fuel monitoring**  
ClassNK offers straightforward solution for owners to comply with the EU MRV scheme

- 12 Going digital**  
The Internet of Things presents both opportunities and challenges to the shipping industry
- 14 MST keeps an open mind**  
Interview with MST:  
Matthias Ruttman, Managing Director
- 16 Guidelines for a hydrogen-powered future**  
ClassNK leads the way towards a safe new generation of Liquefied Hydrogen carriers
- 18 Hidden beauty in the capital**  
Shinjuku Gyoen National Garden
- 19 ClassNK events in 2017**  
An international agenda

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# ClassNKnews

## ClassNK first EGCS ready notation

24 March 2017 - ClassNK issued EGCSR-F (Exhaust Gas Cleaning System Ready Full) notations to nine ships operated by Mitsui O.S.K. Lines, Ltd. This notification signifies that the ship fulfills requirements for SOx scrubber retrofitting.

To enable the safe and secure retrofitting of SOx scrubbers as part of efforts to meet the incoming SOx emission limits, ClassNK joined a project to examine SOx scrubber retrofitting onboard ships in service with industry leading companies Mitsui O.S.K. Lines, Ltd., Minaminippon Shipbuilding Co., Ltd., Sanwa Dock Co., Ltd., and Wärtsilä Japan Ltd.

The aim of the project is to examine the engineering of SOx scrubber retrofits applied to a Pure Car Carrier that is already in-service. The PCC was chosen due to the technical challenges caused by the limited space in the engine room compared to different ship types. ClassNK used the results obtained during the project and compiled them into safety requirements for retrofitting.

ClassNK confirmed that the retrofit plan developed during the project fully complied with project requirements along with corresponding class and statutory requirements, and subsequently issued the EGCS-F notation. Further, ClassNK is now preparing to include the requirement for the issuance of EGCSR-F to its Guideline for Exhaust Gas Cleaning Systems scheduled to be released in July this year.

## ClassNK Guidelines for LH2 Carriers

29 March 2017 - ClassNK released its Guidelines for Liquefied Hydrogen (LH2) Carriers for the safe construction and operation of LH2 carriers based on provisions of IMO Interim Recommendations.

Currently, the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code) outlines safety requirements for gas carriers like LNG. However, there are no specific requirements defined in the code applicable for LH2 carriers that take into account the hazards associated with the handling and transport of LH2.

Hydrogen must be kept at temperatures below  $-253^{\circ}\text{C}$  in order to maintain its liquid state under atmospheric pressure, presenting an even tougher challenge than LNG. In response to growing interest in LH2 transportation, IMO developed Interim Recommendations for Carriage of Liquefied Hydrogen in Bulk which were adopted at MSC 97.

Utilizing its wealth of technical expertise and extensive experience in gas carrier R&D and ship classification, ClassNK has developed its Guidelines for Liquid Hydrogen Carriers which provide safety requirements for the design and construction of LH2 carriers. The guidelines consist of safety requirements applicable to LH2 carriers based on IMO Interim Recommendations, various international standards as well as additional requirements taking specific hazards arising from the handling of LH2 into consideration. *See full article P16-17*

## ClassNK presents at Gastech 2017

30 March 2017 - ClassNK teamed up with major industry players to showcase the latest research and technological developments in the gas sector at Gastech 2017, taking place between 4-7 April in Makuhari Messe, Japan. Presentations covered industry hot topics including the latest innovations in alternative fuel solutions and LH2-related technologies, as well as a wide range of cutting-edge technology and products.

The following companies were presented at the event: Daihatsu Diesel MFG. Co., Ltd., Japan Marine United Corporation, Kawasaki Heavy Industries, Ltd., Kobe Steel, Ltd., Mann Tek, Mitsubishi Heavy Industries, Ltd.,

**Gastech**  
Conference & Exhibition

Mitsui Engineering & Shipbuilding Co., Ltd., National Maritime Research Institute, Niigata Power Systems Co., Ltd., Nippon Steel and Sumitomo Metal Corporation, NYK LINE, Shell, Yanmar Co., Ltd., Yokohama National University, NAPA Shipping Solutions, and ClassNK.

## ClassNK makes MRV move

9 May 2017 - World's largest private weather service company Weathernews Inc. (WNI) and ClassNK welcomed over 100 shipping personalities to their first joint seminar for Monitoring, Reporting, Verification (MRV) held at Glyfada Golf Gardens on 27 April.

EU MRV is an EU regulation on the monitoring, reporting, and verification of carbon dioxide (CO<sub>2</sub>) emissions from vessels, which first entered into force on 1 July 2015.

At the joint seminar, Mr. Takeshi Shimada, General Manager ClassNK EEDI Department explained the EU MRV requirements and its service for shipping companies' compliance to EU MRV as ClassNK has become one of the world's first classification societies to receive an EU MRV verifier accreditation from the UK-based national accreditation body UKAS (United Kingdom Accreditation Service). Mr. Shimada also outlined ClassNK's verification scheme for the reports generated with WNI's solution.

Mr. Jesse Vecchione, Operations Leader of WNI Europe, presented the newly launched Emission Status Monitoring solution as well as its Service Model of

Fleet Performance Management. WNI's Emission Status Monitoring Report consists of four steps/service menus: 1. Monitoring Plan Support, 2. Ship Reporting Support, 3. Data Gap Control Support, 4. Emissions Report Support.

WNI and ClassNK have shared the goal to keep their customers familiar and updated on the new and old challenges and the two organizations feel confident this target was successfully achieved through the seminar. *More on MRV p10-11*



(l-r) Mr. Thomas Skov, EU Sales Director, WNI; Mr. Takeshi Shimada, General Manager of EEDI Department, ClassNK; Mr. Jesse Vecchione, Operations Leader, WNI Europe

## ClassNK e-Certificate authorized

6 April 2017 - ClassNK received authorization from the Liberian Registry to provide Liberian flagged vessels with electronic certificates for statutory surveys. ClassNK is the world's first classification society to be authorized by the Liberian Registry to issue certificates in electronic form. *See full article p8-9*

### Authorization Letter from the Liberian Registry



## ClassNK Consulting Service launches Bunker Fuel Oil Analysis Service

15 May 2017 - ClassNK's subsidiary, ClassNK Consulting Service (NKCS) has officially launched its Bunker Fuel Oil Analysis Service. It is important to understand the properties of bunker fuel oil in order to ensure the safety of vessels and to prevent equipment failure.

NKCS's Bunker Fuel Oil Analysis Service provides an oil analysis report for the properties of bunker fuel oil based on the ISO8217 Standard with advice such as oil heating and purification.

Testing laboratories are located worldwide in Singapore, UAE, UK, and USA. After sampled oil is received at the nearest laboratory from each ship, an analysis report will be provided by email and online within 48 hours.

In addition to analysis based on the ISO8217 Standard, the Bunker Fuel Oil Analysis Service also provides special analysis services based on request, such as asphaltene analysis, measuring the degree of oxidation, analysis using FCA (Fuel Combustion Analyser), GC-MS (Gas Chromatography Mass Spectrometry) and FT-IR (Fourier transform infrared spectroscopy).

# 2020 vision

## ClassNK finds ways to address the impending SOx regulations

With the introduction of a global cap of <0.50% sulfur emissions from 1 January 2020, all ships are faced with yet another challenge to overcome. The implementation date, stated in MARPOL ANNEX VI, was confirmed by IMO at MEPC 70 after reviewing fuel availability at 2020. While lauded for the positive impact on the atmospheric environment, bringing down the level of sulfur emissions from the current <3.5% cap outside Emission Control Areas will require significant investments on the part of the shipowners and the support of the maritime industry.

Fortunately, shipowners have a number of options available to reach compliance. Alternative fuels as well technologies such as Exhaust Gas Cleaning Systems (EGCS) are recognized by the regulations. All of these mitigation measures are already widely [and commercially] employed by on-land sources. However, a lot must be taken into consideration when applying their use onboard.

For shipowners, the foremost concern is cost. According to research

carried out by IMO, the price of applicable fuels at 2020 such as Marine Gas Oil (sulfur content 0.10%) and Heavy Fuel Oil (sulfur content 0.50%) are expected to be USD616 and USD595 per ton respectively, compared to current usable Heavy Fuel Oil (sulfur content 3%) at the costs estimated at USD466 per ton, a cost increase of roughly 32% and 27% respectively. [While these figures are not set in stone, they provide an indication of what is yet to come. Some fluctuations can also be expected geographically at the outset.

So while the use of these fuels may be the most practical choice in terms of ease of application, there are still many other factors to consider. The low viscosity of the new fuel oils can lead to problems such as fuel leakage, and the new specification among the scrubbers and residual oil could cause other irregularities. Also, the financial burden of these fuels alone may likely prompt owners to seek other SOx mitigation measures.

Another possible solution that is gaining traction in the industry is the

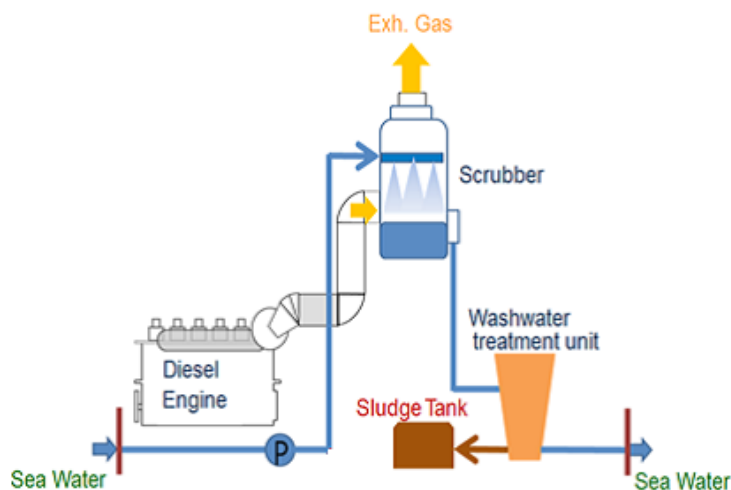
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*An IMO study estimates that roughly 3,800 vessels will have EGCS installed by 2020, mainly used in the ECA*

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use of alternative fuels. Although the use of fuels such as methanol, biofuels, liquefied petroleum gas and others are still in the research stage, liquefied natural gas (LNG) is already a viable candidate for the industry. Due to its low carbon content, LNG has lower GHG emissions compared to HFO when used in propulsion systems. In addition to the near 100% elimination of SOx emissions, PM emissions are also virtually non-existent, and nitrous oxide (NOx) emissions can be potentially lowered by 85-90%, compared to conventional diesel engines burning HFO.

However, the upfront costs required to use LNG may not be viable for some shipowners, especially in the case of older existing vessels. Gas fueled engines and the infrastructure for refueling are clearly more complicated than that for the conventional liquid fuel. With the cost of retrofitting taken into account, this option may prove more expensive than







the combined MGO and HFO fuel route if the vessel is not in service long enough to recoup the initial expenses. Therefore, IMO predicts that up to only 170 vessels including bulk carriers, container ships, and tankers operating within ECAs and on short-haul routes will use LNG as a fuel by 2020.

Exhaust Gas Cleaning System (EGCS) technology, also known as SOx scrubbers, is another way to meet the SOx emission standard. SOx scrubbers have been used in on-land SOx anthropogenic sources since the 1970s, and have recently been adopted for marine use. The technology commonly uses water jet injection/spray to dissolve sulfur as well as particle matter from exhaust gases and discharge them in washwater to receiving water. In addition, some residue may be stored as a slurry to be disposed of at a later stage. IMO has already established the discharge criteria for washwater, and some local authorities have enforced regulation on dis-

charge at their ports and estuaries. Such additional requirements will increase OPEX.

The application of EGCS on vessels, while widely covered in theory, is yet to come into mainstream use. However, an IMO study estimates that roughly 3,800 vessels will have EGCS installed by 2020, mainly used in the ECA. In order to provide a roadmap for the industry, ClassNK teamed up with Mitsui O.S.K. Lines, Ltd., Minaminippon Shipbuilding Co., Ltd., Sanwa Dock Co., Ltd., and Wartsila Japan Ltd. to examine SOx scrubber retrofitting in ships in service. Using a Pure Car Carrier, EGCS was retrofitted on the vessel to investigate the associated technical challenges such as those presented by the confines of the engine room. ClassNK confirmed that retrofit plans developed during the project fully complied with project requirements along with corresponding class and statutory requirements, and subsequently issued its first EGCSR-F (Exhaust Gas Cleaning Sys-

tem Ready Full) notation. With this notation scheme coming into place within 2017, shipowners will have a set of clear guidelines to equip their vessels with EGCS.

Another EGCS project that ClassNK supported was Drive Green Highway, which was headed by K Line in cooperation with Mitsubishi Heavy Industries (MHI), Japan Marine United (JMU) and Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT). The project saw a Pure Car/Truck Carrier (PCTC) fitted with hybrid SOx scrubbers in addition to a wealth of environmentally-friendly solutions such as composite NOx and CO<sub>2</sub> emissions reduction technology and auxiliary engine exhaust gas recovery systems (EGR).

The road to SOx emission compliance is by no means an easy task, but by working together with the relevant industry, ClassNK is committed to supporting the development of viable solutions.

# ClassNK takes lead on e-certification

## E-certification lifts the paperwork burden and is a tool to fight fraud

Shipping's digital future is not short on promises, but recent Liberian Registry authorization for ClassNK to provide Liberian-flagged vessels with electronic certificates for statutory surveys is a digital promise realised. As well as reducing the administrative burdens associated with the sending and onboard storing of paper certificates, e-Certificates make information easier to retrieve.

Their use is also a logical next step in the technological transformation of ship registration. The new system issues Class and Statutory certificates in a secure electronic

format, cutting down on the workload for shipping companies and those at sea.

IMO has amended its Global Integrated Shipping Information System (GISIS) to encompass flag states issuing electronic certificates. This means that electronic certificates can in effect be considered as meeting the requirements for certificates in hard copy on board a ship.

The Liberian Registry has been in the vanguard in issuing electronic certificates such as Minimum Safe

Manning, Civil Liability Convention and Registration Certificates, but ClassNK is the first society it has authorized to issue certificates in electronic form.

Using elements of the Liberian Registry's own digitized certificates widely recognized in IMO, ClassNK has developed the ClassNK e-Certificate, which conforms with the Guidelines for the Use of Electronic Certificates (FAL.5/Circ.39/Rev.2) issued by IMO in April 2016.

The ClassNK e-Certificate format was developed in line with IMO's







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*E-certification allows owners to manage the transmission and receiving of electronic data to ships, and verify the authenticity of certificates online*

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updated Guidelines. The certificates concerned include: Load Line; SOLAS (SC, SE, SR, Exemption Certificates); MARPOL (IOPP, NLS, ISPP, IAPP, EIAPP, IEE); AFS; BWMS; ITC; SMC; ISSC; and MLC. Each certificate features a unique tracking ID number or Quick Response Code so that the validity of the certificate presented can be checked via the ClassNK website.

From March to June 2017, ClassNK was the sole classification society authorized by the Liberian Registry to issue these e-Certificates in the new initiative, with the flag authority also requesting Port State Control and others to permit their use.

For its part, ClassNK accepts that one of the key challenges facing e-Certificates will simply be getting port au-

thorities, Port State Control and other inspection organisations to move on adoption, especially as some will prefer to retain hard copy back-ups. ClassNK says it will work towards the development of a highly-secure and trusted system for stakeholders.

As well as enabling the transmission and receiving of electronic data offshore, e-certification allows owners to manage the transmission and receiving of electronic data to ships, and verify the authenticity of certificates online. Documents with their own digital signatures can only be altered by those authorized by ClassNK. This makes it more difficult for the fraudsters to falsify or manipulate data, in an industry where ships leave a paper trail that is as burdensome as it is necessary.

With e-certification, ClassNK has responded to regulators, but has also heard a more passionate plea from owners and seafarers - for the paperwork load needed for compliance to be lifted, and for shipping to truly join the online community.

# Enabling EU fuel monitoring compliance

## ClassNK offers straightforward solution for owners to comply with the EU MRV scheme

The deadline for compliance with the European Union's new MRV (Monitoring, Reporting and Verification) regulation targeting CO<sub>2</sub> emissions is fast-approaching. By 31 August 2017, a Monitoring Plan must be submitted for any commercial ship over 5,000 GT undertaking one or more voyages into, out of and between EU ports indicating the method for monitoring and reporting CO<sub>2</sub> emissions, irrespective of flag.

The company, which according to the regulations is the shipowner or any other organisation or person, such as the manager or the bareboat charterer, which has assumed the responsibility for the operation of the ship from the shipowner must submit the developed Monitoring Plan to a verifier accredited by an EU recognized accreditation body, and collect information and develop the Emission Report in accordance with the assessed Monitoring Plan.

The scheme therefore pushes ahead of IMO's Energy Efficiency Design Index for new vessels, and its Ship

Energy Efficiency Management Plan, which are the first steps in putting greenhouse gas emissions provisions in place for ships.

From 1 January 2018, under the EU scheme, the companies must be able to supply per-voyage and annual monitoring statistics. By April 2019, and by the same time in each subsequent year, verified annual emission reports must be submitted to the EC and the relevant flag state.

As of 30 June 2019, all ships must carry a valid Document of Compliance (DOC) covering the relevant reporting periods. EU Member States will be able to penalise the companies for failure to comply and, in the case of ships that do so for two or more consecutive reporting periods, penalties may include an expulsion order - notified to the EC, EMSA, the other EU Member States and the flag State concerned. Ultimately, EU regulators also see the MRV scheme as the basis for CO<sub>2</sub> reduction targets.

ClassNK became one of the world's first classification societies to re-

ceive accreditation from the United Kingdom Accreditation Service as an EU MRV verifier, effective from 1 March 2017.

"With extensive experience in the GHG verification, we are committed to providing the same high-quality assurance services for the EU MRV assessment and verification activities," says Toshiro Koiwa, Director of ClassNK's Assurance Operations Division.

Compliance demands transparent documentation of both method and procedures for each ship. Accordingly, the ClassNK service assesses Monitoring Plans, verifies Emission Reports and issues Documents of Compliance (DOC). After verification of the Emission Report and issuance of the DOC, companies must retain the DOC on board the ships.

The monitoring plan itself needs to contain details of the ship and its responsible party, plus a description of CO<sub>2</sub> emission sources on board the ship, such as main engine, auxiliary engines, gas turbines, boiler and





inert gas generators, and fuel types used. A description of the procedures for monitoring the fuel consumption of the ship is also required.

On a per voyage basis, companies need to monitor port and hour of departure, port and hour of arrival, amount and emission factor for each type of fuel consumed in total, CO<sub>2</sub> emitted, distance travelled, time spent at sea, cargo carried, and transport 'work' (distance travelled x amount of cargo carried). These figures must also be provided on an annualised basis.

The reporting procedure relies on the use of properly formatted software. For authorised ClassNK users, this interaction takes place via the ClassNK MRV Portal, with companies submitting data and documentary evidence.

Once data and documentary evidence from the ship or from shore

have been sent to the server, the company can check the stored data by using the ClassNK portal's visualization function. The software is an optional service for EU MRV that automatically notifies the shipping company if the accumulated data contains errors in accordance with the criteria which is set by the company. The benefit for companies that choose this service is that entries can be validated to ensure the smooth submission of the emission report to the verifier.

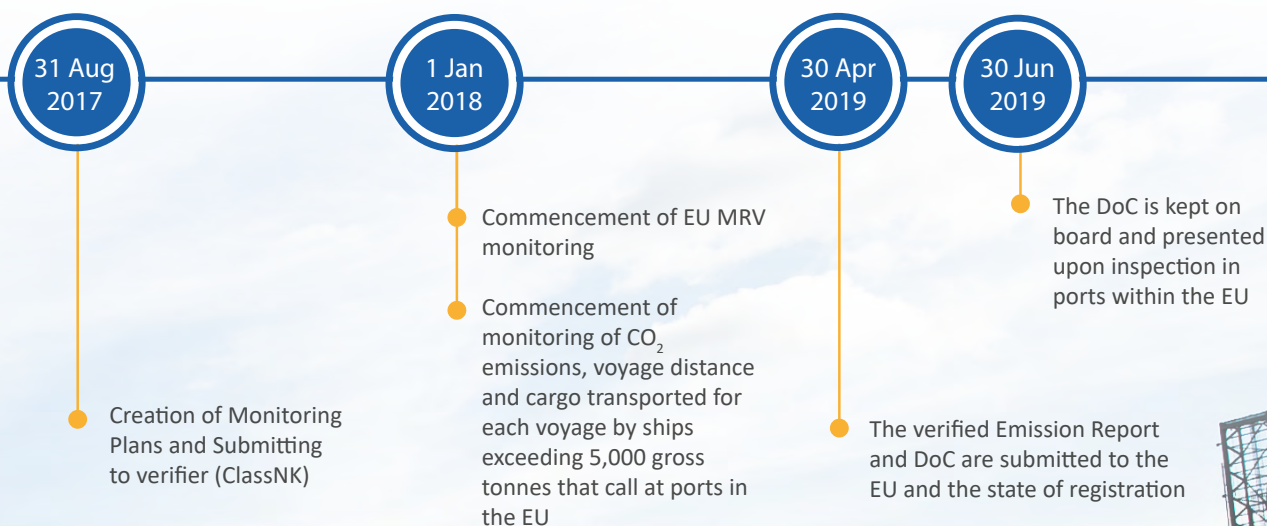
Mr Koiwa says the ClassNK MRV Portal minimizes the workload for shipping companies by controlling and accumulating voyage data in accordance with the EU MRV Regulation, effectively reducing the number of man-days required for emission report preparation.

The service also makes sure that the appropriate information is shared between ships and shore and reduc-

es the follow-up work needed on board by following daily work flows, while the alerting system improves the accuracy of reported data. ClassNK certification services for EU MRV demonstrably reduce costs, Mr Koiwa says.

Following its accreditation in March, ClassNK has been working very hard to raise awareness among key clients of their impending responsibilities, and of the fully developed services that the Society has already put in place. ClassNK Consulting Service Co. Ltd., an independent company, also provides complementary EU MRV services, such as offering guidance on management plan development.

ClassNK believes that the standardized reporting involved in MRV may offer the consistency that can later be exploited for wider vessel performance monitoring and contribute to an ever advancing industry.





# Going digital

## The Internet of Things presents both opportunities and challenges to the shipping industry

The road to digitalization began with the invention of the transistor in 1947. Used to amplify or switch electronic signals and electrical power, transistors paved the way for the modern electronics we use today, and marked the start of the 'digital revolution'. The benefits of digitalization are innumerable, from the accurate calculations to the storage of vast amounts of data.

However, the most crucial development in this revolution is arguably the internet. In the space of some three decades since the introduc-

tion of the World Wide Web, the global economy, as well as the way we do things, has changed dramatically. Immediate access to information is available anytime, anywhere in the world. The proliferation of smartphones increased the convenience of connectivity exponentially. These developments ushered in the Internet of Things (IoT), a phrase for the all-encompassing network of devices connected to the internet. Not only phones and computers, but cars, televisions, and even motion sensors are now transmitting information via the internet. Pre-

viously inaccessible data is available at the touch of a button, ready for storage and analysis. With vast amounts of information from all sorts of devices, harnessing the power of this 'big data' is the next step in the digital revolution.

The shipping industry has come a long way from its analog roots, embracing digital technologies from RADAR to ECDIS. However, it is only in the past few years that the potential of IoT and consequently big data has been exploited in the maritime industry. Information stored



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## *ClassNK is an advocate of the holistic approach to big data analysis*

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in ship data loggers and voyage data recorders are even more valuable. Proper analysis together with other data sets such as machinery and weather data to optimize operations could lead to lower costs, greater safety, and increased cargo quality.

In theory, big data represents opportunities without limit. It is only when putting it into practice that the main challenges are encountered. The large data sets that make up big data come from a range of different devices and an even greater number of formats. The first step is converting data into a uniform standard. ISO published guidelines for the installation of ship communication networks for shipboard equipment and systems in 2013, and is working on standards for sharing field data on the sea as well as data dictionary and format standards. The Japan Ship Machinery and Equipment Association (JSMEA) established the Smart Ship Application Platform 2 Project (SSAP2) to support the application of IoT services to access ship equipment data easily and enhance application services development with the help of these standards.

While network infrastructure is essential in the transmission of big data, it is important to remember that the source of big data is local. ClassNK's award winning condition based monitoring system ClassNK CMAXS is a solution that gathers big data locally on a ship-to-ship basis. Developed in partnership with shipowners, engine makers, and other key players in the industry, the software suite allows users to carry out preventative maintenance and avoid major

machinery malfunctions as well as reduce downtime by analyzing data collected from main engine sensors, and navigation data such as weather and sea conditions. It is only when solutions like this are available that the industry can be ready for the next step in big data.

A huge development in the maritime industry's pursuit of big data was the establishment of the world's first big data center for the maritime industry, Ship Data Center Co., Ltd., in December 2015. The center, also known as ShipDC, is a highly secured onshore data center that collects and stores data from ships, which can then be accessed by authorized users. The key element behind ShipDC is the provision of data to all sectors of the industry. Shipowners, who provide the original data, can choose to share it with engine makers, equipment manufacturers, and others, in return for optimized operations.

Current data capture and transmission methods are still very fragmented. Similar data is often sent to multiple vendors and analyzed on a ship-by-ship basis in a time-consuming process that is not conducive to efficiency or innovation. ShipDC offers a platform for shipping companies to consolidate their data and choose whether to share this with other stakeholders in the industry to achieve greater efficiency through improved monitoring, maintenance and the development of new technologies.

ClassNK is an advocate of the holistic approach to big data analysis. That is why ShipDC not only collates information from multiple vessels, but is open to all vessels regardless of class or company. In addition to collecting data, ClassNK developed technology such as the planned maintenance and automatic condition diagnosis system CMAXS. ClassNK will be developing the interfaces necessary to collect and analyze all information generated on board a vessel.

It may be some years before the use of big data becomes an industry-wide standard, but with the limitless advantages on offer, it might not be that far off.



*Toshio Kurashiki, Regional Manager of South Asia and Oceania, ClassNK receives the Lloyd's List Asia Big Data Award in Singapore, October 2016*

# MST keeps an open mind

## Interview with MST: Matthias Ruttmann, Managing Director

Family-run MST is a prime example of southern German shipping enterprise, with the seemingly unusual location of its headquarters far from the nation's seaports in Schnaittenbach acting as no barrier to growth.

The company that was to become MST Mineralien Schiffahrt Spedition und Transport GmbH in 1985 was originally formed by Jürgen W. Ruttmann as a single ship operation in the 1970s; today, MST manages 17 handysize and panamax vessels from its southern location, including smaller, flexible general cargo vessels and dry bulk carriers of up to 75,610 dwt.

As well as deep-sea shipping, MST also focuses on transportation by truck and rail. Furthermore, the

company is involved in Germany's inland waterway, building a reputation for providing its clients with safe transport at reasonable costs.

Today the Managing Director is Matthias Ruttmann, who took over the company helm from his father in 2009. Born and raised in Bavaria, he completed his business studies at the Rotterdam School of Management and HEC in Paris, before gaining experience at a large Dutch multinational in Amsterdam and joining MST in 2004.

Matthias Ruttmann drives the growth of the MST shipping fleet through a combination of taking the opportunities presented by slow markets to snap up affordable as-

sets and creativity when it comes to attracting investors to the business. It is a strategy that has served the company well, but it also one that requires constant renewal.

Mr. Ruttmann says: "What is a change in this 'brave new world' is that there is no single obvious way to attract investors. We explore many roads and for every project that makes commercial sense we have so far found an investment model. Traditional equity today is just one possible avenue."

It is a commitment that requires dependable partners, he says, adding that the association with ClassNK is longstanding. In fact, the working relationship was initiated when







Matthias and Jürgen Ruttmann, respectively Managing Director and Founder of MST

“ We appreciate the approach ClassNK is taking, with a focus on quality and service and at the same time offering a competitive package ”

the company acquired its first second-hand Japanese built vessel. It has deepened over time, particularly in recent years, due to what the Managing Director says is “the highly competitive and quality minded services provided by ClassNK”.

From 2012 ClassNK stationed a new Survey Department Representative in its Hamburg Office, to enhance its speed of response and decision-making capability for clients in Germany and throughout Europe. Uptake of the Society’s services by German owners has grown in response, while ClassNK’s presence in Germany has also supported its participation in joint R&D projects investigating bulk carrier safety and others.

“We appreciate the approach ClassNK is taking, with a focus on quality and service and at the same time offering a competitive package,” says Mr. Ruttmann. “The ClassNK office in Hamburg provides an excellent bridge to Japan during our working hours and we are supported by highly capable people. The same is true for all ClassNK supervisors who cooperate with us in the countries adjacent to our main trading area, the Atlantic Ocean.”

As well as operating in the US, Canada, South America, the Caribbean, and Europe, MST also serves the St Lawrence River and Scandinavia with ice-class ships and is committed to expand this segment in the future.

Mr. Ruttmann believes that reliable and high quality partners are always appreciated, but never more so than in difficult times “when reliability is also key to the relationships with our customers”. The remarks are welcome, particularly since Mr. Ruttmann goes on to say that the growth in the MST fleet points towards the company expanding in terms of cargo diversity and serving more ‘pockets’ of the Atlantic Ocean and its adjacent seas.

“The Atlantic Ocean is big enough [for MST] for at least the next decade; we aim to be the best dry bulk company in our segment in the region, offering a tight network of vessels to our customers. Reliability and flexibility are the main fleet characteristics, while keeping an open mind towards new ways of delivering cargoes to the end customer is our priority.”

Also a priority is the exploitation of opportunities presented by new technology to assist in making shipping operations and management more efficient, Mr. Ruttmann says. MST prides itself for the attention it pays to optimising efficiency for its onboard machinery and in its efforts to enhance crew maintenance work procedures.

Talking from a fleet and crew manager perspective, Mr. Ruttmann says: “Basically all integrated planned maintenance, drydocking and supply software are essential these days. We are even considering condition-based maintenance with the help of ClassNK so that we concentrate on other duties onboard and ashore. We also welcome ClassNK initiatives with regards to digitalisation of certificates.

“We have suggested some other items from our wish list like remote inspections and other ideas that greatly rely on new satellite technology, so we understand that this needs to be done in cooperation with other partners as well. We’d like to thank ClassNK for their open mind, ears and eyes, and their cooperation on our day-to-day and future challenges.”

# Guidelines for a hydrogen-powered future

## ClassNK leads the way towards a safe new generation of Liquefied Hydrogen carriers

As a zero emission fuel and with availability around the world, hydrogen has the potential to transform modern society. Harnessing fuel-cells as the power source for private vehicles is the most visible of society's growing initiatives to exploit hydrogen energy, but considerable work remains before hydrogen power generation can be supported on an industrial scale. One key component will be the ability for ships to carry large amounts of liquefied hydrogen worldwide.

This is a main area of focus for HySTRA (CO<sub>2</sub>-free Hydrogen Energy Supply-Chain Technology Research Association), which is promoted by NEDO (New Energy and Industrial Technology Development Organization) in Japan. Established in 2016, HySTRA has participation from Kawasaki Heavy Industries, Ltd., Iwatani Corporation, Shell, and J-Power (Electric Power Development Co., Ltd) and aims to conduct a series of technical demonstrations to identify issues facing commercialization of the supply chain.

HySTRA has a roadmap for operational stages that need to be addressed to deliver a viable LH2 carrier, ranging from initial cool down/loading/

unloading of liquefied hydrogen to sea going operations using a newly built pilot LH2 terminal in Kobe, Japan. With the Final Investment Decision stage progressing through 2017, the first LH2 Carrier is nonetheless expected to debut as soon as 2020.

ClassNK has been closely involved in these developments, contributing through risk assessment safety in an LH2 Carrier Front End Engineering Design (FEED) project undertaken at the end of 2015, working with, Kawasaki Heavy Industries, Ltd., Shell International Trading and Shipping, Japan Marine Science and National Maritime Research Institute. The target of the assessment is a preliminary design of 2,500m<sup>3</sup> capacity liquefied hydrogen carrier. The Society's leading role in the field is also demonstrated through its recently-published new Guidelines covering ships able to carry Liquefied Hydrogen.

"As a low carbon energy source, the use of hydrogen as a fuel offers significant potential to solve environmental problems caused by fuel emissions," says Hayato Suga, Director of ClassNK's Plan Approval Division. "However, realising that potential calls for practical solutions,

so that its production is economically viable and it is carried in a secure supply chain to the place of consumption. Movement by ship represents the most efficient long distance transportation option for LH2, and ClassNK is positioning itself at the forefront of related technological developments."

Hydrogen must be kept at temperatures below -253°C to maintain its liquid state under atmospheric pressure, presenting an even tougher handling and storage challenge at sea than LNG. Currently, the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code) outlines safety requirements for gas carriers like LNG, but there are no specific requirements for LH2 carriers covering its handling and transport hazards.

Hydrogen also has a lower boiling temperature than methane, for example, as well as lighter density, higher upper flammable limit, lower ignition energy. Hydrogen leakage from pipes or cargo containment system may result in catastrophic consequences such as fire or explosion.

ClassNK's safety work, as part of the new LH2 carrier design with KHI, has



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*A conceptual drawing of the Pilot LH2 Carrier (courtesy of HySTRA)*



*Kawasaki Heavy Industries design concept for an LH2 Carrier*

focused on the hydrogen systems onboard, and how to build on experience with LNG carriers to develop viable LH2 cargo handling and cryogenic storage solutions in pressure vessel type cargo tanks with vacuum multi-layer insulation. Effective measures also need to be employed to reduce the possibility of leakage of hydrogen taking its high permeability into account.

The full risk assessment identified some 89 hazards as needing to be addressed to bring an LH2 carrier design to market, although only 10 were identified as ‘serious’. Particular attention has been given to the risks associated with thermal stress on cargo piping or cargo tanks, and

dealing with any potential unreliability in the emergency shut-down of the ship-shore interface.

ClassNK’s new guidelines take in the provisions set out in IMO Interim Recommendations for Carriage of Liquefied Hydrogen in Bulk, adopted by the Maritime Safety Committee at IMO in November 2016.

ClassNK identified 23 additional safeguards, over and above the requirements of the IGC Code and the special requirements previously envisaged at IMO, all of which have been covered by the special requirements in the interim guidelines developed at IMO. The new safeguards focused principally on ventilation,

fire suppression, enclosed spaces management and hydrogen detection. Additional Risk Control Options also extend to recommendations covering an insulation panel on the outer shell of the cargo containment system, Pressure Relief Valves of cargo tanks capable of relieving boil off gas during vacuum loss of the insulation system.

Developments at IMO are being crafted to offer a formal framework for anticipated agreements between Flag and Port Administrations over the carriage of LH2 based on a provisional assessment, following a proposal from Australia and Japan to the MSC in December 2014. A subsequent Correspondence Group involved 19 members under a Japanese coordinator. After adoption of the interim Recommendations last November, an agreement between Australia and Japan brought application of the safety requirements to a pilot LH2 carrier.

“The new guidelines are therefore very timely,” says Mr Suga. “They crystallise the work ClassNK has done to date to bring the LH2 carrier concept to reality, in line with the needs of the market and regulators, and provide a template to review LH2 carrier ship design. Through additional safeguards, we have been able to reduce potential risks associated with LH2 transportation across the board. Further risk assessments, e.g. HAZID, HAZOP, FMEA etc. are due to be carried out to the pilot ship and the related system/equipment, corresponding to the design stage. All of this will consolidate ClassNK’s position at the forefront of LH2 carrier innovation.”



# Hidden beauty in the capital

Nestled in the heart of the Tokyo metropolis is Shinjuku, arguably one of Japan's most popular destinations. Shinjuku Station is the busiest in the world, with an average of over 1.7 million passengers passing through its gates each day. It is only after exiting one of the sprawling station's fifty exits that you can get a sense of the scale of the area.

High-rise office buildings compete with enormous department stores for their share of the skyline - with every type of restaurant and bar filling every other nook and cranny. The streets are bustling day and night with suit-clad businessmen and throngs of tourists from around the world. You could spend all day exploring what Shinjuku shopping has to offer, and not even see half the city. More importantly, you would miss out on the area's unique assets.

Even the most ardent city-lover needs a respite, and that is exactly what Shinjuku Gyoen National Garden of-

fers. Just a ten minute walk southeast of the station, the discreet walled garden is almost a hidden treasure. For as little as 200 yen (roughly 1.60 euro) visitors can gain access during normal opening hours from 9am to 4pm Tuesday through Sunday.

Opened on the land of a former feudal lord in 1906, Shinjuku Gyoen National Garden has been a place of fun and relaxation for Tokyo's denizens and tourists alike for many generations. At 58.3 hectares, the park can be traversed from one end to the other in under 20 minutes, but that's not to say there is nothing to see along the way. Within the garden are three distinct themes - the Japanese Traditional Garden, French Formal Garden, and English Landscape Garden - each as beautiful as the other.

Every garden has its own atmosphere. Tranquility can be found among the carefully sculpted trees of the Japanese Traditional Garden,

standing in perfect harmony with its still ponds and silent pagoda. The vast openness of the English Landscape Garden is often the scene of family picnics filled with the sounds of children's laughter. The flowers of the French Formal Garden watch couples young and old walk by hand in hand in silent regard of their elegant surroundings.

With roughly 500 varieties of trees and flowers blooming throughout the year, there is something to see in every season. Those lucky enough to visit in late April can see the cherry blossoms as their petals fall from hundreds of trees in a blanket of faint pink snow.

Only when venturing to the edges of the garden can you see the impressive architecture of Tokyo peeking over the trees to remind you that you are still in the heart of the world's most populous city. And outside those walls is more of Japan waiting to be explored.





# ClassNK events:

- ◆ **NOR-SHIPING, OSLO, NORWAY, 30<sup>TH</sup> MAY - 2<sup>ND</sup> JUNE**  
Please visit ClassNK at booth #B03-19
- ◆ **KORMARINE, BUSAN, KOREA, 24<sup>TH</sup> - 27<sup>TH</sup> OCTOBER**  
Please visit ClassNK at booth #5L17
- ◆ **INTERNATIONAL WORKBOAT SHOW, NEW ORLEANS, USA, 29<sup>TH</sup> NOV- 1<sup>ST</sup> DEC**
- ◆ **MARINTEC CHINA, SHANGHAI, CHINA, 5<sup>TH</sup> - 8<sup>TH</sup> DECEMBER**  
Please visit ClassNK at the Japanese Pavilion

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