ClassNK

MAGAZINE

Summer 2020 - 87th Edition

- ◆ *Digital Grand Design for sustainability*
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Rising to the challenge

Welcome to the 87th edition of the ClassNK Magazine

It is a pleasure to preside over this edition of the ClassNK Magazine for customers, which is the first to be published since my appointment as ClassNK President & CEO in March.

I would like to acknowledge the continuing role this publication plays in communicating ClassNK's work in support of safer, more secure and more environmentally responsible shipping. I also take this opportunity to thank my forerunners for their contributions in this regard, and especially my immediate predecessor, Mr. Koichi Fujiwara, ClassNK Chairman of the Board of Directors.

Clearly, 2020 is proving to be an extraordinary year, in which the coronavirus pandemic has touched almost every aspect of daily life. I am fully aware that this is a critical time for the people involved in global shipping, as well as business prospects. In this context, I would echo International Maritime Organization Secretary-General Kitack Lim in calling for immediate concerted action to end our industry's crew change crisis.

Alongside protecting its own staff, ClassNK's primary concern has been to support its clients in facing their Covid-19 challenges, whether by increasing use of electronic class and statutory certificates, investing in IT to enhance remote capabilities, or postponing surveys (subject to flag approval). While worldwide travel restrictions are easing, we expect remote-inspection techniques will continue to play a larger role in the shipping industry from now on.

In fact, as an article published in this edition highlights, ClassNK has already developed its Digital Grand Design 2030 (see p10) to expand its activities based on opportunities presented by digital technology. On p18, we also feature PrimeShip PSC Intelligence – a digital platform to help owners and operators enhance their safety management. Again, pages 14-17 explore ClassNK's new autonomous ships guidelines, Approval in Principle of APExS (Action Planning and Execution System), the autonomous ship framework for NYK Line, and ongoing project details.

Meanwhile, ClassNK continues to extend other parts of its service offering in response to market requirements, and this edition also includes a focus on our new "Rules for the Survey and Construction of Governmental and Naval Ships".

After surveying this edition, our hope is that readers will come away briefed that, wherever challenges emerge across the maritime industries, ClassNK is ready to meet them.

Hiroaki Sakashita, President & CEO

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ClassNKnews

CSMS certification for NYK

16 December 2019 - ClassNK has certified the Cyber Security Management System (CSMS) of NYK Group subsidiary NYK LNG Shipmanagement Ltd. and its LNG carrier "PACIFIC MIMOSA" – the first CSMS certified by the Society. The CSMS certification inspection confirms information about the CSMS for both the company and the ship, and assesses cyber security policies, risk assessment and more, in line with standards established by the Society. In this specific inspection, the CSMS of NYK LNG Shipmanagement Ltd. and "PACIFIC MIMOSA" were confirmed to be in line with ClassNK's standards. The Society will continue providing cyber security services that address the needs of clients and promote safe navigation.

AiP for LNG-fueled vessel

17 December 2019 - ClassNK has granted NS United Kaiun Kaisha, Ltd. and Imabari Shipbuilding Co., Ltd. an Approval in Principle (AiP) for their joint project on the concept design of an LNG-fueled capesize bulker. An Imabari Shipbuilding representative described the main features of the design: "By installing two Type-C LNG tanks at the stern, it is possible to build an LNG-fueled vessel without significant changes to the conventional vessel's basic blueprints. The design adopts a low-pressure dual-fuel main engine, which enables the use of gas that has naturally vaporized from the LNG tanks in the main engine without any waste, thereby reducing environmental impact and running costs. This can achieve CO_2 emissions that are 30% less than the reference line as required under EEDI Phase 3 by the IMO."

MASS guidelines released

9 January 2020 - ClassNK released new "Guidelines for Automated/Autonomous Operation of Ships" (see story, *p14*). Technology related to maritime autonomous surface ships (MASS) is expected to develop based on various concepts. The new guidelines include the earlier "Guidelines for Concept Design of Automated Operation/Autonomous Operation of Ships (Provisional Version)", issued in 2018, and are available free via the "My Page" service on the ClassNK website.

PHP secures compliance

15 January 2020 - ClassNK has issued a Statement of Compliance (SoC) to PHP Ship Breaking and Recycling Industries Limited, a ship-recycling facility in Bangladesh, verifying its adherence to the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (HKC). The statement was issued upon review of the ship-recycling facility plan developed by PHP and on-site inspections to confirm that its ship-recycling processes followed this plan. It was the first SoC awarded by the Society to a facility in Bangladesh.

Digital Grand Design for 2030

25 February 2020 - ClassNK has developed "ClassNK Digital Grand Design 2030", demonstrating its vision for the digital society of 2030 (see full story, p10). With the concept of "Creating innovation for a blue economy", the Society expands its technology and knowledge to ocean-related business and aims to bring innovation to the maritime industry. To achieve this, they have established the following three fundamental policies:

- Further improve safety and efficiency by the development of new technical services based on data utilization such as survey systems in line with condition monitoring and evaluation technologies, and the creation of individual ship charts.

- Diversify certification services and expand their scope. In particular, create new value in ocean-related businesses by providing support with new challenges involving integrated onshore and offshore logistics services.

- Support the realization of social innovation brought by digital technology and new challenges by establishing various rules and flexible environmental aspects.

"We will cultivate advanced human resources who have not only specialized knowledge, but also knowledge of digital technology, and develop our accumulated information and know-how," said Dr. Toshiro Arima, Corporate Officer and General Manager of Digital Transformation Center.

AiP for LPG ship systems

13 March 2020 - ClassNK has granted an Approval in Principle (AiP) to Daihatsu Diesel for its concept design of an LPG-reformed, gas-fueled coastal LPG carrier. The Society's Senior Executive Vice President T. Shigemi had this to say: "LPG is becoming a viable option in the maritime industry, and we have high expectations for its impact on environmental safety and efficiency."

In February 2020, ClassNK also granted an AiP to Kawasaki Heavy Industries, Ltd (KHI) for its LPG fuel supply system. Mr. Hayato Suga, corporate officer and Director of Plan Approval and Technical Solution Division commented: "Through our professional third-party verification on cutting-edge technology, we will continue supporting the development of alternative fuels including LPG."

Left: Daihatsu Diesel President Shigeki Kinoshita;
Right: ClassNK Senior Executive Vice President
Toshiyuki Shigemi

PrimeShip-Hull updated

7 February 2020 - ClassNK has released the latest version of its design support software PrimeShip-HULL (HCSR), Ver.7.0.0, incorporating the latest rule amendments to the IACS Common Structural Rules for Bulk Carriers and Oil Tankers. Various functions have also been added or improved. For example, in the rule calculation software, the creation speed of calculation reports has been increased significantly and their PDF file size greatly reduced. Additionally, it now contains an "L. Member Parameter Copy" function, which can be used to quickly reflect the update information of longitudinal members in other sections. The report creation function has also been improved, and an arbitrary model view for evaluated fatigue hotspots can now be added to the report.

Revised condition-based rules

9 March 2020 - ClassNK released new CBM Guidelines explaining revised rules for using condition-based maintenance (CBM) in class surveys, after reviewing requirements for planned machinery surveys. The new guidelines respond to the need for more detailed requirements for adopting CBM in maintenance surveys. Their introduction follows ClassNK's research agreement – announced in November 2019 – for developing advanced CBM, a new maintenance and management process for engine machinery plants and a new survey scheme based on CBM. The joint project will use manufacturer expertise to optimize CBM guidelines and verify them on actual ships. The latest CBM guidelines are available via the free service "My Page" on the ClassNK website.

3D plan approval passes test

19 March 2020 - ClassNK, Japan Marine United (JMU), and NAPA have completed a joint feasibility study on 3D-model-based plan approval using 3D CAD models. The investigation concluded that information required for class approval can be confirmed using a 3D CAD model. The results of the survey will serve as a basis for future studies, and the Society will continue working with the industry to realize 3D-model-based plan approval. Mr. Hayato Suga, corporate officer and Director of Plan Approval and Technical Solution Division commented: "I hope the entire sector will recognize the opportunities and increased efficiency made possible by this initiative. The vessels of the future will be able to accommodate better and safer designs in shorter amounts of time."

Standards set for governmental ships

31 March 2020 - ClassNK has established its "Rules for the Survey and Construction of Governmental and Naval Ships" (see full story, p20). During overseas transfer, governmental ships and onboard machinery may be subject to third-party quality inspections requested by foreign authorities. The new Rules enable risk-based safety assessment and condition-based maintenance to ensure quality and reduce ship life cycle costs. ClassNK has established standards for conducting third-party certification of governmental and naval ships and onboard equipment as their Rules for the Survey and Construction of Governmental and Naval Ships, available in the "Technical Rules and Guidance" section of the ClassNK website for those registered to "My Page".

ClassNK news

AiP for long-range LNG

1 April 2020 - ClassNK granted an Approval in Principle (AiP) to SHIN KURUSHIMA DOCKYARD CO., LTD. for its concept design of a 49,000DWT LNG-fueled chemical tanker. The ship has two independent Type-C LNG fuel tanks installed on deck that minimize the impact of fuel on cargo tank volume. Its design enables the ship to run for approximately 40 days on LNG fuel. The LNG fuel tank and gas piping have been optimized through the positioning of the fuel control room between the cargo tank and the engine room, facilitating smooth fuel supply to the main engine, main power generator, and auxiliary boiler.

AiP for LPG-fueled bulk carrier

27 April 2020 - ClassNK granted an Approval in Principle (AiP) to Imabari Shipbuilding Co., Ltd. for its concept design of a 180,000 DWT LPG dual-fueled, capesize bulk carrier developed with Mitsubishi Shipbuilding Co., Ltd. This is the world's first AiP for an LPG dual-fueled bulk carrier, based on ClassNK guidelines incorporating provisions from the International Code of Safety for Ships using Gases or other Low-Flashpoint Fuels (IGF Code). The design eliminates the necessity to consider boil-off gas by handling LPG at room temperature and high pressure. Installed in the aft bridge area, the LPG tank will support roundtrips between Japan and Australia.

Safety first for ammonia

30 April 2020 - Imabari Shipbuilding Co., Ltd., MAN Energy Solutions, Mitsui E&S Machinery Co., Ltd., ClassNK, ITOCHU ENEX Co. Ltd. and ITOCHU Corporation have agreed to jointly develop ships equipped with a main engine using ammonia as its main fuel ("Ammonia-fueled Engine"). In line with international momentum towards decarbonization, the early development of zero-emission ships is anticipated with ammonia a prime candidate for a suitable zero-emission, alternative fuel. The agreement extends to the question of owning and operating the ships, supplying ammonia fuel and developing ammonia supply facilities. ClassNK's role will focus on conducting a third-party safety assessment to the project, while the Society also intends to develop guidelines based on the results obtained.

Autonomous NYK framework approved

14 May 2020 - ClassNK granted an Approval in Principle (AiP) to Nippon Yusen Kabushiki Kaisha (NYK Line) and MTI Co., Ltd. for their joint project on the concept design of an autonomous ship framework (development code "APExS"). Jointly with NYK Line and MTI, ClassNK verified the safety of system usage conditions, fallback systems and more, as part of the development of the autonomous ship framework. The AiP was then granted after the feasibility of the framework had been confirmed through safety evaluation in line with the above guidelines. The Society will continue to improve the environment for the use of automated/autonomous operation technologies by providing standards for advanced initiatives and technological verification.
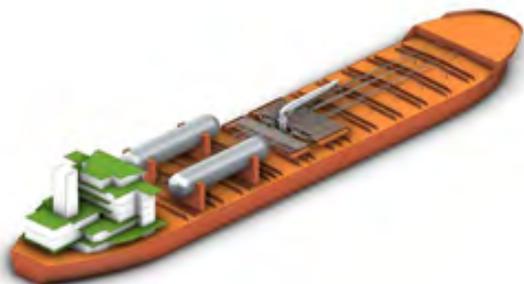
Picture courtesy of SHIN KURUSHIMA DOCKYARD CO., LTD.

Picture courtesy of Imabari Shipbuilding Co., Ltd.

ClassNK wins Seatrade Safety Award

24 June 2020 - ClassNK won the Safety Initiative Award at the Seatrade Maritime Awards Asia 2020 held online on June 23 for its initiatives with cyber security. The award recognized ClassNK for its practical and comprehensive initiatives such as the release of guidelines on cyber security, and for providing certification services which have contributed to the safety of marine shipping amid the increasing threat of cyberattacks. In December of last year, ClassNK certified the Cyber Security Management System (CSMS) of NYK Group subsidiary NYK LNG Shipmanagement Ltd. and its managed LNG carrier "PACIFIC MIMOSA", making it the first CSMS certified by the Society. Since then, it has continued to carry out CSMS inspections in response to the applications from various companies.

Port State Control update

2 July 2020 - ClassNK released its annual report on Port State Control, providing information about ships detained by PSC as well as deficiencies that were found on board in 2019. Status of implementation and recent developments in PSC worldwide is included. The PDF version of the Port State Control Annual Report can be downloaded for free by accessing the ClassNK website via this link: Port State Control Annual Report June 2020 - English.

ClassNK amends class rules

3 July 2020 - Leading classification society ClassNK released amendments to its Rules and Guidance for the Survey and Construction of Steel Ships issued on 30 June 2020. ClassNK is constantly revising its Rules and Guidance to make them more rational and transparent based on industry requests, research and development outcomes and feedback from damage investigations, as well as changes in line with relevant international conventions, International Association of Classification Societies unified requirements (UR), national regulations, etc. The latest document includes 48 amendments and is available in "Rule Amendments for Technical Rules" section of "ClassNK My Page". A registered user of "ClassNK My Page" can also access all ClassNK Rules and Guidance: ClassNK website.

Ship Carbon Recycling WG launched

16 July 2020 - ClassNK has participated in the first Ship Carbon Recycling Working Group, as one of nine founding members of an initiative formed within Japan's Carbon Capture & Reuse (CCR) Study Group. Other members comprise EX Research Institute Ltd., Hitachi Zosen Corporation, Japan Marine United Corporation, JFE Steel Corporation, JGC Corporation, Mitsui O.S.K. Lines, Ltd., Nippon Steel Corporation, and Sanoyas Shipbuilding Corporation. The WG is exploring the feasibility methanation in delivering zero-emission ship fuels. Methanation technology synthesizes methane, the main component in natural gas, causing a chemical reaction between hydrogen and CO_2. CO_2 emissions can be significantly reduced by using hydrogen generated by electrolyzing water with electricity derived from renewable energy.

ClassNK joins MTS-ISAC on cyber security

7 July 2020 - ClassNK has become the first classification society and the first non-US organization to join the Maritime Transportation System Information Sharing and Analysis Center (MTS-ISAC). The International Maritime Organization (IMO) has a deadline of January 1, 2021 for Maritime Cyber Risk Management to be addressed in Safety Management Systems. Meanwhile, the U.S. Coast Guard will be inspecting Maritime Transportation Security Act of 2002 regulated facilities for cyber risk management efforts for the first time starting with annual inspections occurring on or after October 1, 2021. The MTS-ISAC, which was formed in February of this year, has seen rapid adoption of its Cybersecurity Information Sharing Services, and has produced a number of maritime cybersecurity advisories sourced from member shared information. Hirofumi Takano, Executive Vice President at ClassNK, explains, "By joining the MTS-ISAC, we will have increased visibility to current, real-world examples of cyber threats targeting MTS stakeholders. This provides us an opportunity to reinforce how, and periodically update, ClassNK's cyber security standards."

The positive touch

ClassNK's new President & CEO is driving innovation to meet digital and climate challenges

Hiroaki Sakashita was appointed as Representative Director, President & CEO, ClassNK in March 2020, following his promotion from the role of Senior Executive Vice President.

Holding a bachelor's degree in Naval Architecture and Ocean Engineering, from Yokohama National University, Mr. Sakashita started his career at Japan's Ministry of Transport (now Ministry of Land, Infrastructure, Transport and Tourism) in 1980. During his career with the government, he played vital roles in maritime administration including regulatory oversight and industry development. He assumed the position of Director-General of the Maritime Bureau in 2015, and Deputy Minister for Technical Affairs, Minister's Secretariat in 2016.

Mr. Sakashita says that working in policymaking in the government was a formative experience. "Through communicating with people concerned, analyzing information and data, distilling the main areas for concern, formulating possible solutions, and then negotiating and sometimes compromising, I secured deep insights on a professional and personal level. I learned a lot about the value of taking a bird's eye view of issues and by trying to see them through the eyes of my counterparts."

As part of his work with the MLIT, Mr. Sakashita was also involved directly in formulating the initial mandatory International Maritime Organization scheme covering ship emissions. "That was a really exciting experience," he says, recalling what he also describes as "one of the high points of my career".

"Japan played a key role in establishing regulations for the reduction of GHG emissions from international shipping. The EEDI and SEEMP schemes stipulated in the MARPOL Convention were proposed by Japan. That was the first international climate regulation in the international transport sector. Now, of course, IMO has gone on to develop targets for 2030 and 2050, but there was something extra special about being part of that first team effort."

After joining ClassNK as an Executive Consultant in 2018, Mr. Sakashita was appointed as Senior Executive Vice President in 2019, and tasked with overseeing ClassNK's expansion of its business portfolio and digital transformation.

"The maritime sector is being driven by the tides of digitalization and necessary action on climate change," he says. "Maritime business will evolve dramatically as a result of these two factors and ClassNK will expand its service capabilities to support clients as they face up to the resulting challenges. To meet what I consider to be a new stage in the development of the shipping industry, there will be an increasing need for the independent third-party organizations that can assure the safety, environmental performance, and quality of new technologies or concepts.

"I believe that the challenges posed by climate change and digitalization therefore offer ClassNK an opportunity to diversify and expand its business activities and services. With its new executive team, we will actively participate in new innovative initiatives, to enhance our capabilities and pave the way for the development of new technologies and the propagation of their benefits throughout the industry."

As Senior EVP, Mr. Sakashita had already been given license to innovate when it comes to service development and digitalization strategy. Last year, he was appointed to lead a cross-sectional cyber security project team made up of key ship and security experts within ClassNK, to accelerate the development of the Society's cyber security services in response to the expanding needs of clients. The newly assembled team brought together the expertise behind ClassNK's new "Cyber Security Approach", which envisages a balanced combination of physical, technical, and organizational steps towards cyber resilience.

The new approach incorporates making ships and onboard equipment secure by design and developing management systems to mitigate cyber risks in service in both information technology (IT) and operation technology (OT). It also works within the framework defined by "Guidelines for Designing Cyber Security Onboard Ships" (February 2019), "Cyber Security Management System for Ships" (March 2019) – which includes management measures to mitigate against cyber risks in navigation – and "Guidelines for Software Security" (June 2019).

The cross-sectional cyber security project team has been brought together in recognition of needs envisaged under the Maritime Safety Committee (MSC) resolution encouraging administrations to ensure that cyber risks are addressed in existing safety management systems after January 1, 2021. It has also been tasked with developing new types of cyber security class notation for ships, ship/company management system certification and more. In December 2019, NYK Group subsidiary NYK LNG Shipmanagement Ltd. (LNGSM) saw the LNG carrier *Pacific Mimosa* accredited by ClassNK under the ship management company's Cyber Security Management System (CSMS), in the first cyber security certification conducted by ClassNK.

In recognition of its practical and comprehensive approach to cyber security, ClassNK won the Safety Initiative Award at the Seatrade Maritime Awards Asia 2020 held online on June 23. The Safety Initiative Award category recognizes initiatives that contribute to the safety of the maritime industry.

Whatever aspects of the digital and climate-change challenges ClassNK sets out to meet in the period ahead, Mr. Sakashita is convinced that analysis, collaboration and compromise will continue to serve him well in developing the right approach. "Being positive is my motivation," he says. "There are a lot of tasks to be dealt with, and most of them are not easy to complete. Being positive will be essential in finding the key that leads us a step closer to a solution under difficult circumstances. Besides, analyzing the situation and discussing possible solutions with colleagues and counterparts in a constructive manner is enjoyable. Furthermore, while achieving expected results can bring a great sense of accomplishment, even if the result is disappointing, we should not take it too badly: in some ways, falling short of a target simply creates a new starting point from which to work towards success."

Digital Grand Design for sustainability

ClassNK's Digital Grand Design frames its strategy for a more sustainable industry

Today we are witnessing a profound shift as the world acknowledges the urgency of facing up to the global climate crisis and related environmental challenges. There are no easy solutions, but part of the answer lies in taking a more sustainable approach to business.

Accordingly, ClassNK is ramping up its efforts to ensure its activities align with the aspirations embodied in the United Nations' Sustainable Development Goals (SDGs) – a col-

lection of 17 global goals announced in 2015 as a 'blueprint to achieve a better and more sustainable future for all' by 2030.

Elements of the SDGs can be applied across nearly all of ClassNK's activities. For instance, our survey and approval services functions are key to preventing pollution of the marine environment (Goal 14) and ensure seafarers are safe as they go about their work (goals 4 and 8). Meanwhile our R&D into renewa-

ble energy technologies and future fuels for ships is aimed at reducing GHG emissions (Goal 13) and transitioning to cleaner energy (Goal 7). Our efforts in tackling industry-wide challenges and contributing to regulatory development will promote sustainable practices and foster innovation (Goal 9), impacting across the board.

At the same time, as the maritime industry seeks to retool to reduce its carbon footprint and become more

sustainable, another transformation is taking place: shipping companies large and small are shedding their analogue past and turning to digital technology in ever greater numbers. These two trends may, at first, seem unrelated, but that is not so. In fact, ClassNK believes digital technology is key to achieving the UN's goals for building a better world, and it is this link that underpins the formulation of the Digital Grand Design.

So, what does digitalization mean for ClassNK and for the industry as a whole? It is perhaps easiest to start by stating that it does not change our unwavering commitment to supporting the smooth running of the marine industry by ensuring safety and protecting the environment.

For most of its 120-year history, ClassNK has managed to fulfill this function by working with key stakeholders, such as shipbuilders, equipment manufacturers and vessel operators, each with clearly defined relationships and well-understood roles.

The digital revolution, however, will see the arrival of new players leveraging the data collected onboard ships and forming collaborations with existing stakeholders to create new value for vessel owners and others in the maritime supply chain. By enabling rapid and accurate performance monitoring and benchmarking, data sharing will dovetail with the emergence of new business models resulting from a shift to more sustainable practices as set out in the UN's SDGs. It is not inconceivable that these two trends will converge and accelerate the uptake of digital technologies across the maritime domain.

Of course, there are plenty of unknowns and it is impossible to predict exactly how this transformation will play out, but some outcomes are clear. Firstly, data sharing is not a matter only for shipyards and shipping lines, but has implications for other stakeholders, particularly

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cargo owners and forwarders who will pounce on the opportunity for greater transparency and accountability. It will also offer a platform for new stakeholders such as digital forwarders and system integrators. As we depart from the orthodox maritime operating model, ClassNK too will evolve, adjusting the way it operates in order to interface with and serve the needs of a greatly expanded range of players.

ClassNK has come through numerous turning points in the shipping industry from the boom in international trade that led to shipping playing an essential role in the rise of today's globalized economy to the staggering diversification in vessel types that have resulted from ever-greater specialization. Whatever the demands, it has always managed to evolve its practices, adopt the latest technology, and embrace new approaches in order to meet emerging needs and continue to ensure that ships are as safe as they can be.

ClassNK sees four main ways in which it can assist the industry in responding to the needs emerging from digitalization: data assurance; technology assurance; anticipating regulatory hurdles; and by rational rating/evaluating.

Using data to make better decisions is the fundamental premise of digitalization. Data collection is already becoming standard practice on an increasing number of vessels for

monitoring the condition of engines and other mission-critical equipment. Some operators have invested in systems for sending this data ashore, either to their technical departments or sometimes directly to equipment manufacturers for deeper analysis.

For these endeavors to succeed, it is therefore imperative to ensure data collecting systems are reliable and trustworthy and that the data itself meets certain levels of quality. Although sensors and associated hardware for collecting data will likely improve and grow more reliable over time and new methods for evaluating and sifting data utilizing techniques such as algorithms and machine learning will no doubt emerge, there is a mounting need for an impartial arbiter of data quality. As an independent third party with extensive engineering expertise, ClassNK is ideally positioned to fulfill this role.

It is often noted that the maritime industry is characterized by conservatism, which slows the acceptance of any novel or untested technology. However, the problem is especially pronounced with digital innovations, which tend to develop at a much faster pace. With new functionalities becoming available in quick succession and a shortage of early adopters, there is little scope for vessel operators to watch and learn from the experience of others – the sector's preferred approach to technology adoption.

This resulting hesitation means there is a danger that new systems for enhancing safety and/or operational efficiency that could offer immense benefit will be rejected or sidelined, amounting to an opportunity lost for an industry already facing tightening markets. Here too ClassNK can exploit its impartial status by collaborating with technology providers to assess and vouch for the quality and performance of new solutions and give weight to their claims. This would increase confidence among vessel owners who may otherwise be wary of introducing digital innovations, and help the sector more generally rise above any doubts or mistrust.

A slow-to-change regulatory environment may sometimes put the brakes on the adoption of digital solutions. Whenever new technology or approaches are proposed it is imperative that they are verified as fit-for-purpose – especially when safety hangs in the balance. The difficulty arises when a novel solution falls outside existing regulatory frameworks or requires an altogether new testing regime, as this may significantly extend the approval process.

ClassNK is leveraging both its in-house expertise and links with relevant governmental bodies, standards organizations and maritime authorities to establish suitable evaluation methodologies and contribute to the development of appropriate regulations ahead of time in order to accelerate the implementation of new technology in real-life applications.

Lastly, there is a need for rating information and accurate evaluation founded on engineering principles. To date, ClassNK, in common with other classification societies, has inspected and issued approvals for ships based on the IMO's rules for steel ships and related instruments. However, a wider focus is necessary to cope with the assessment needs of new business models and unorthodox collaborations between a broader array of stakeholders.

ClassNK sees considerable potential for applying the substantial technical knowhow it has accumulated for quantitatively assessing ships and their systems for inspection and type-approval purposes to meet these emerging needs.

The Digital Grand Design incorporates a roadmap that will help ClassNK calibrate its efforts in order to exploit the opportunities described above and respond to the demands that the digital revolution makes on the maritime industry. It is built on three main pillars: advanced surveys; the creation of a progressive business environment; and third-party certification/evaluation/rating.

Over the years, ClassNK has accumulated the technology to assess and evaluate the structure of ships and their various machinery systems with exceptional accuracy, through its activities in design approval and ship surveys. And by implementing the new digital technology, we will ensure that this philosophy undergoes continuous improvement.

Diversification – particularly of certification – is necessary because data sharing will lead to a proliferation of new functionalities, new stakeholders, and new ways of creating value that simply cannot be accommodated in today's regulatory framework. ClassNK will therefore step up its efforts in pursuing the development

This marks the beginning of the next phase in ClassNK's continual evolution, as it helps steer the industry into an uncharted future shaped by increasing digitalization and mounting pressure to reduce its environmental impact

of graduated certification and rating systems, which can be deployed alongside, or instead of, the more traditional pass/fail binary compliance model.

Furthermore, appraising these functionalities according to engineering principles as an impartial third party will serve as a catalyst speeding up the adoption of digital solutions by providing reassurance to vessel owners nervous about implementing untested technologies.

ClassNK wants to ensure that such new technologies are implemented smoothly and without delay. Digital technologies tend to develop at a much faster pace than is the norm for innovation in, say, hull designs or machinery systems, and demand agile processes for evaluating their performance and identifying potential implications on vessel safety.

To stay ahead in this race, ClassNK plans to run alongside the shipping lines and firms taking on the challenges in developing and pioneering the use of new solutions. Establishing a framework for utilizing the understanding and knowledge gained from this closer collaboration will accelerate the wider deployment of these technologies across the industry.

The Digital Grand Design therefore marks the beginning of the next phase in ClassNK's continual evolution, as it helps steer the industry into an uncharted future shaped by increasing digitalization and mounting pressure to reduce its environmental impact.

Working together with ship owners and operators, ship management companies, shipbuilders, equipment manufacturers and a host of organizations and governmental bodies, ClassNK will continue to offer quality assurance services founded on engineering principles and years of technical knowhow that ensures vessels are seaworthy, that protects the lives of seafarers and that prevents harm to the marine environment.

On top of this, we will support the evolution and sustainable growth of our customers' marine business by exploiting cutting-edge digital technologies to enrich the services we provide and deliver them more efficiently.

While survey and certification services form the bulk of our day-to-day business, ClassNK actively contributes to making the industry safer by engaging in fundamental research and participating in global forums that guide development of the rules overarching the way ships are designed, operated and maintained.

In the Digital Era, we will continue to throw our weight behind ensuring that these rules do not obstruct innovation unnecessarily and, where the benefits are clear, that they are adjusted to support it.

A platform for MASS development

New ClassNK guidelines offer foundation for autonomous shipping to build on

Targeted for widespread deployment by 2025, maritime autonomous surface ships (MASS) promise improved safety and efficiency in shipping operations. However, these benefits are unattainable without the proper application of various systems and processes. To help ensure that MASS fulfill their purpose, ClassNK recently issued 'Guidelines for automated/autonomous operation on ships'.

These guidelines outline the requirements and procedures for verifying the functions of automated operation systems (AOS), as well as remote operation systems (ROS) on vessels or in onshore remote operation centers (ROC). They cover design, installation and operation, with the ultimate objective of securing the ship's safety.

In designing the AOS concept, several basic elements are to be clarified in the interests of safety. For example, the target task to be automated – including all subtasks – should be clearly defined. How these subtasks are divided between humans and AOS should also be determined, with a human-machine interface (HMI) established to ensure that relevant persons have all the information they need to perform their duties.

Furthermore, the operational design domain (ODD) – the areas and conditions in which the AOS can operate – is to be set up alongside a fallback for cases where the system deviates from the ODD. The equipment needed on a ship or at the ROC to allow the system to function properly should also be defined, which may be expressed as the 'prerequisite specification for system installation'.

Safety Assessment for AOS/ROS

Computer systems are to be designed for optimal performance and in accordance with appropriate standards, while cyber-security and risk-assessment measures should also be put in place. The system supplier must create functional-requirement specifications taking these – and all of the above elements – into account.

As for the development of the AOS, this should be based on appropriate

These guidelines outline the requirements and procedures for verifying the functions of automated operation systems (AOS), as well as remote operation systems (ROS) on vessels or in onshore remote operation centers (ROC)

standards for functional safety such as IEC 61508 and ISO 26262. A suitable quality management system in line with ISO 9001 should be used for software development and testing. Furthermore, a function confirmation test shall be performed to verify that the AOS satisfies functional requirements.

The system supplier should be responsible for upgrading the AOS and dealing with any bugs. The supplier should be able to ensure and verify the validity and reliability of software and hardware that make up the system, as well as to plan various tests, such as function verification tests, shop tests and system integration tests.

Test plans are to be submitted to ClassNK for approval, along with other relevant documentation. This includes the application for type approval, the functional-requirement specifications for the AOS, the results of the risk assessment and tests and any documents related to the design and development system and process.

For the AOS to be installed on the ship, risk assessment must first be conducted based on the hazards associated with the ship-system connection. Hazards include those caused by the HMI, those related to cyber security, the malfunction of sensors and control devices, the effects of the AOS on other shipboard systems and errors in AOS operation.

Additionally, certain drawings and documents should be submitted, including those detailing system architecture on the vessel, ODD, risk assessment results, user manual, documents on software version control related to the AOS, test plans and anything else deemed necessary by ClassNK.

Upon approval and completion of the installation, the Society carries out a system integration test to verify the function and safety of the AOS; the possibility of interactions with other onboard systems and whether these, if present, affect vessel safety; and whether it is necessary to tune the AOS in line with ship specifications. If ClassNK considers it necessary, the onboard system-integration test is followed by a sea trial.

Explanatory documents are to be prepared for the individuals involved in the automated/autonomous operation of the ship, covering the basic requirements for ensuring safety and the functions of the AOS. Onboard crews should also be trained in AOS operation where necessary.

In addition to fallback and cyber security measures, procedures are to be established for the maintenance and management of AOS software and hardware, as well as for guaranteeing traceability in software changes and updates and recording methods.

If any software changes are to be made that may affect the safety and reliability of the AOS, they should first be approved by ClassNK. Documents outlining the change method, execution and verification, as well as the justification for making the change, are to be submitted to the Society.

Regarding the ROS, whether it is located on a vessel or in a shoreside ROC, it is to be fitted with reliable equipment appropriate to the remote-monitoring or control task being performed; this may be subject to examination by ClassNK. Any information or actions to be monitored

remotely are to be clarified and shared with concerned parties, with the type and degree of information they receive determined by the task.

Remote operators are to have the requisite knowledge, experience and skills to perform their assigned tasks effectively; this, too, will be verified by the Society. The division of responsibility between remote operators and crew on board is to be clearly defined.

The communication network between ship and ROS is to be capable of transferring data as quickly and in as much volume as necessary. Risk assessment methods should be established to address poor communication, as well as hazards relating to monitoring oversights, operating errors and cyber-attacks. Furthermore, fallback measures should be put in place to ensure safety in the event of communication failure during remote monitoring or control.

Autonomous reality

ClassNK is involved in various demonstration projects and continuously works to develop necessary safety standards in order to support the development and implementation of automated/autonomous operation technologies from a safety perspective.

In May 2020, ClassNK announced that it had granted an Approval in Principle (AiP) to NYK and MTI Co., Ltd. for their joint project on the concept design of an autonomous ship framework. Known by the acronym APExS (Action Planning and Execution System), the framework deploys high-speed computer-based information processing technology and risk analyses that support crew members' situational awareness and the decision-making necessary for maneuvering. In fact, the approach envisages the computer executing maneuvering op-

erations under the crew's approval. ClassNK verified the safety of system usage conditions, fallback systems, and more toward the development of the autonomous ship framework. The Society then granted the AiP after confirming the feasibility of the framework through safety evaluation in line with the above guidelines.

Based on this framework, NYK has stated that it intends to further deepen its cooperation with domestic and overseas partners for the development of autonomous ship technology that contributes to advanced safe operation.

NYK has also stated that it will utilize the APExS framework in the future to realize an autonomous ship with crew by working together with partners on a common understanding of the ideal autonomous ship with crew. Its model includes BRM (Bridge Resource Management) – an ap-

MASS testing takes shape

To cultivate its knowledge and experience of remote operation centers (ROCs), ClassNK is actively participating in demonstration tests with a number industry players, including an NYK-led tugboat project that seeks to make progress toward remote ship navigation by 2025.

NYK and its group companies MTI Co., Ltd., Keihin Dock Co. Ltd., and Japan Marine Science Inc. (JMS) successfully tested the remote navigation of a tugboat operated by Shin-Nippon Kaiyosha, as part of the Japanese government's Sea Trial Project on Remote Control Navigation within Tokyo Bay.

Equipped with a remotely controlled system with crew, the vessel was operated from a ROC in the city of Nishinomiya in Hyogo prefecture approximately 400 kilometers away. The tugboat was maneuvered approximately 12 kilometers between an area off Honmoku and an area off the port of Yokosuka.

The operator in the remote operation center was able to use sensors and cameras installed on the tugboat to recognize surrounding conditions and created a route plan and action plan (collision avoidance route plan). The operator shared the plans with the tugboat captain, who then approved them. The remotely navigated tugboat proceeded to operate in accordance with the approved route plan and action plan.

To date, the NYK Group has been working with equipment manufacturers and partners to develop a remotely controlled system that can support the crew. Such a system would collect, integrate, and analyze information around the ship, prepare an action plan, and after the approval of operators at remote locations or on board, act in accordance with the plan.

In the period ahead, NYK and its group companies will work to overcome ship-to-shore communication issues revealed during the tests and further improve the system. They aim to conduct remote navigation tests using a tugboat again within this fiscal year, in order to verify the optimization of ship-to-shore communication of data and reflect the technical issues raised in the last fiscal year. An NYK statement said that the shipping company would also continue to work with its partners to develop technology for large vessels in the future.

Japan's Ministry of Land, Infrastructure, Transport and Tourism has been promoting initiatives that can make a positive impact on shipping's environmental performance since 2018 and identifies establishing autonomous ship safety requirements as a material contribution. Companies selected to participate in sea trials on remote control navigation include: MTI Co., Ltd.; ClassNK; National Institute of Maritime, Port and Aviation Technology; IKOUS Corporation; NYK; Keihin Dock Co., Ltd.; Mitsubishi Shipbuilding Co., Ltd.; IHI Power Systems Co., Ltd.; BEMAC Corporation; SKY Perfect JSAT Corporation; TOKYO KEIKI INC.; Nippon Telegraph and Telephone Corporation; NTT DOCOMO, INC., Japan Radio Co., Ltd.; FURUNO ELECTRIC CO., LTD.; and Japan Marine Science Inc.

proach designed to minimize human errors by enriching communication and cooperation among crews, and using all available information from navigation instruments to improve situation awareness and decision making within the bridge. Introducing BRM to bridge operations and training crews of its use is mandated by the IMO STCW Convention.

ClassNK's latest guidance therefore provides both a comprehensive and timely set of standards against which the real work to develop safe and reliable MASS can measure itself. The Society will continue to improve the environment for the use of automated/autonomous operation technologies by providing standards for advanced initiatives and technological verification to establish an autonomous maritime ecosystem.

The intelligent approach to PSC

PrimeShip PSC Intelligence anticipates owner needs when an inspector calls

Part of ClassNK's 'total ship care' philosophy, PrimeShip PSC Intelligence was created as a digital platform to assist shipowners and operators to enhance their safety management. It allows superintendents and their counterparts involved in fleet management to analyze and identify deficiency trends recorded at individual ports or for a country as a whole.

Digital development

PSC Intelligence is one fruit of ClassNK's continuous efforts to offer best of breed technical services by engaging in a continuous program of research and development into new solutions that enhance ship safety. In recent times, these efforts have focused on how best to combine growing volumes of operational ship data with ClassNK's technical experience to derive new insights that meet and anticipate the needs of the marine community.

The systems and services that make up this 'total ship care' package have been developed and are offered by ClassNK under the PrimeShip brand. PrimeShip-branded initiatives are identifiable by their lifecycle approach to ensuring the comprehensive safety of ships and the prevention of marine pollution.
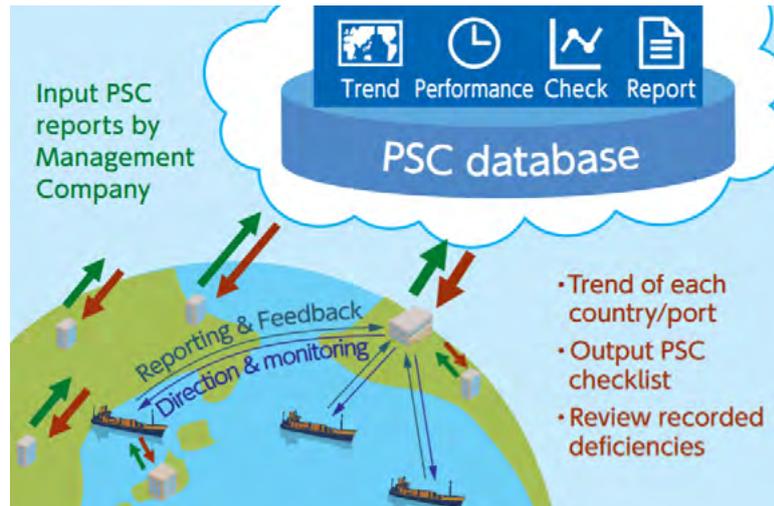
This work is aimed at supporting ship safety at every stage of a ship's life from inception and design through construction, operation, management and maintenance. Aspects of these lifecycle processes of a ship are integrated in PrimeShip in an interactive, consistent and harmonized manner.

PrimeShip integrates the existing software systems, guidance, databases and other services with state-of-the-art monitoring and diagnostics technologies to improve the efficiency of the total ship care services offered by the Society. At the same time, PrimeShip is itself under continuous refinement to accommodate new software developments, new functionality and new tasks.

Smart maintenance

PSC Intelligence offers owners a dedicated function for producing PSC checklists based on the most frequent items inspectors flag up. That list can be downloaded and forwarded to ships in good time so that crew can incorporate them into work plans and adjust their maintenance schedule accordingly.

The system can also be used internally by an organization, so that an owner can produce actionable data regarding its operational fleet. The ability to extract data and rank compliance deficiencies raised on an owner's vessels is both an aid for future reviews and a benchmark to implement long-term improvements in ship management systems.

The online platform has four main operating modes:
- trend analysis;
- performance analysis;
- fleet check; and
- report generation.

Features overview

In Trend mode, PSC Intelligence allows users to examine trends in recorded deficiencies and detention numbers on a world map. Clicking on an individual port will bring up a panel listing the most frequent deficiency categories. Users can then drill down for more detail to see precisely what caught inspectors' attention. Filtering options allow users to hide minor observations and focus on more important items, such as detainable deficiencies.

Performance mode gives users a better picture of how well vessels in their own fleet are measuring up in PSC inspections and thus contributes to the development of proactive maintenance strategies. By default, ships are listed according to their age because, as a general rule, older vessels with ageing machin-

ery systems and other equipment have a higher maintenance burden, which means crews are busier and there is greater risk that potential inspection items will be overlooked.

However, there are many other options available. It is possible, for instance, to list by detention ratio, which will highlight vessels with a poor compliance history regardless of age, to rank geographically based on inspection frequency by country or port, or to show fleet performance in calendar format. To further support analysis and provide greater flexibility, all these options can be configured to show a subset of the fleet based on different criteria.

In Check mode, PSC Intelligence lets ship owners and operators review deficiencies recorded against vessels in their fleet by frequency and compare against benchmarks for the ClassNK fleet as a whole. Again, various ranking options enable owners to identify recurring issues, reveal the ports' trends, or pick out problematic vessels, thus allowing them to target resources and carry out appropriate safety measures.

The solution also comes with built-in functions for straightforward reporting of PSC performance. These make it quick and easy to generate PSC checklists for vessels due to call at particular ports, or to produce summary reports showing overall PSC performance, which can support strategic decisions related to vessel maintenance practices.

Easy access

PSC Intelligence is available free of charge to owners and operators of vessels in ClassNK class or vessels whose ISM/ISPS/MLC are registered with ClassNK. It is accessible immediately from the Web Service Portal, ClassNK's online hub for managing essential data related to ship maintenance and management, such as survey status and due dates for class and statutory survey items, upcoming ISM/ISPS audits and MLC inspections. In addition to serving as a dashboard for the ongoing and timely maintenance and management of ships, Web Service Portal lets users make online applications for surveys, audits and other inspections.

Steady improvement

The Port State Control system was established to reduce the operation of sub-standard ships and improve the quality of shipping. It comprises a number of inspection regimes managed under regional Memorandums of Understanding (MoUs).

The latest figures released by the Paris MoU (to which 26 EU states and Canada are signatories) show a steady decrease in detentions in the three-year period between 2016 and 2018, and the level of detaina-

ble deficiencies falling to 3,171 from 3,883 in 2017. The top five deficiency categories were fire safety (13%), safety of navigation (12.07%), life-saving appliances (8.17%), labor conditions (7.96%) and certificates and documentation (7.14%).

A similar pattern can be seen in figures from the Tokyo MoU, representing 20 states across the Asia Pacific Region. In 2018, 31,589 inspections, involving 17,301 ships, took place. Of these, 934 were detained

due to serious deficiencies found onboard. The ship detention rate (2.96%) thus continues on a gradual downward trend.

A total of 73,441 deficiencies were recorded, marking a year-on-year drop of 2,667 or 3.5%. Fire safety measures (13,340), safety of navigation (10,127) and lifesaving appliances (9,363) continue to be the top three categories of deficiencies discovered on ships, representing 45% of the total recorded deficiencies.

ClassNK offers governments a hand

Rules for the Survey and Construction of Governmental and Naval Ships launched

The recent publication of new "Rules for the Survey and Construction of Governmental and Naval Ships" confirmed that a new staging post has been reached in ClassNK's role as a provider of technical standards applying to governmental and naval vessels and their onboard equipment.

ClassNK has provided its services to governments in Africa, Central America, Southeast Asia and Oceania, surveying naval ships and non-naval newbuilds that have included research vessels, patrol boats, barges, tugs and more.

The new Rules crystallize the knowledge and technological expertise available to the Society in a format that is accessible to foreign authorities seeking third-party inspection and surveying services as part of overseas transfer of governmental ships and their onboard equipment. They also provide the basis for risk-based safety assessment and condition-based maintenance (CBM), helping to ensure safer operations and reduced ship lifecycle costs.

In summary, ClassNK has established standards for the third-party certification of governmental and naval ships and onboard equipment within Rules for the Survey and Construction of Governmental and Naval Ships.

The thinking behind the new Rules and their content is explored in the following Q&A.

> *The new Rules crystallize the knowledge and technological expertise available to the Society in a format that is accessible to foreign authorities seeking third-party inspection and surveying services*

What was the motivation for developing Rules for Governmental Ships?

Japanese expertise in defense equipment technology has attracted interest from overseas, but items supplied have remained subject to quality inspections requested by foreign authorities. ClassNK established standards to conduct third-party certification of governmental and naval ships and their onboard equipment to contribute to the progress of the overseas transfer of defense equipment and technology. Under the Japanese government's 'Three Principles on Transfer of Defense Equipment and Technology' and using ClassNK rules, shipbuilders and marine equipment manufacturers engaged in the defense industry can offer their services abroad providing more options to choose from, which may result in cost reductions for some governments.

Our rules contribute to improving competitiveness.

Have there been examples of foreign authorities requesting third-party services from ClassNK in the recent past?

Aside from naval ships, we have provided third-party surveys for patrol and work boats belonging to the Philippines government, geophysical survey vessels flying under the Bangladesh flag, utility vessels from Fiji and dozens more. The establishment of Rules for the Survey and Construction of Governmental and Naval Ships will pave the way for ClassNK to better serve the sector, also providing a framework within which to develop services and allocate new business resources.

The latest survey and technical requirements are based on "Rules for

Survey and Construction of Steel Ships". What steps has ClassNK taken to enhance its services relating to the types of highly ductile steel (HDS) typically used for naval ships?

We are preparing special notations for ships applying HDS under Rules for the Survey and Construction of Governmental and Naval Ships. HDS can greatly benefit defense ships. For example, it is likely to minimize damage caused by collisions: according to past research on merchant vessels, the experiment results showed that HDS could provide hull structures with three times more energy absorption in a collision than conventional steel. Furthermore, replacing grade D and E plates with HDS in the central sections of ships is expected to reduce cost.

Part of the focus appears to be on ClassNK's CMAXS condition-based monitoring solution, which is already widely used in merchant shipping. Are there specific benefits of applying the CMAXS CBM system to governmental ships, or are the benefits the same as they would be for any ship?

The idea of utilizing CBM to increase safety and reduce lifecycle costs applies to merchant and governmental ships alike. However, the benefit of using CBM on the engine and deck machinery of governmental and naval ships, which require high-density outfitting, is potentially even greater than it is for merchant vessels.

Is CMAXS applied to any new system for a governmental ship, beyond what has been offered for commercial ships?

We have begun developing "ClassNK CMAXS NAVY", which will use the established technology to diagnose the condition data from machinery or equipment in operation on naval vessels. These ships require high redundancy to minimize the impact of any damage, so they generally feature more complex systems with vast amounts of equipment and machinery. By combining our own understanding of the unique characteristics of governmental ships with input from shipowners and shipbuilders experienced in operating or building them, we will develop a practical system that is tailored to the vessels' specific needs.

Another area of focus has been the use of the 3D CAD system to realize digital twins. Is this especially useful in the case of governmental ships?

As measuring technology, information communications technology and information processing technology continue to progress, they will advance the development of CBM, which enables the maintenance of ships by digital data and thereby the realization of digital twins. With plan approval using the 3D-CAD system already established, players in the industry are investigating how to utilize data, facilitate the sharing of drawings and augment the drawing process to provide further benefit to shipowners and shipbuilders. As a classification society, ClassNK can contribute to these efforts by developing a plan evaluation program and survey scheme based on data.

A key component here is the digitalization and central management of the entire ship lifecycle, including drawing, construction and maintenance; this will help to optimize the shipbuilding process and reduce lifecycle costs. With their complex machinery and equipment, governmental ships in particular will benefit from this.

Autumn homage to Japanese heritage

Japan's autumn festivals bring history to life

Japan is a nation of rich tradition and culture, and its many shrine festivals give visitors the chance to discover and celebrate this unique heritage for themselves. With a multitude of events held throughout the land – from the biggest cities to the smallest villages – under normal circumstances autumn is a particularly busy period in the Japanese festival calendar.

In 2020, social gatherings have been profoundly affected by coronavirus. This has resulted the cancellation of Tokyo's Kichijoji Autumn Festival this year. Usually, this event attracts thousands of visitors from across the metropolis and beyond. The lively procession sees mikoshi – palanquins crafted and decorated in the ancient Japanese style – carried through the streets of the normally laidback suburb, culminating in a vibrant display of traditional music and dance at the Musashino Hachimangu Shrine. First held in 1973, the festival welcomes the arrival of the harvest season.

As well as mikoshi, larger structures in the shape of shrines or temples – known as *danjiri* – are paraded through Japanese settlements during the autumn months. Spectacles of this kind are called *danjiri matsuri,* or cart-pulling festivals, and the most famous of these is a far older event, which takes place in the city of Kishiwada, Osaka. Like the *mikoshi* in Kichijoji, the *danjiri* in Kishiwada are thought to transport deities. Unique to *danjiri matsuri,* however, is a race in which neighborhood teams haul their carts across town. The Kishiwada festival dates back to 1703, when the city's ruler prayed for a bountiful harvest.

Kyoto is famed for its three great festivals, one of which is held on October 22. The *Jidai Matsuri* – "Festival of the Ages" – focuses on the traditional industrial arts cultivated over the course of more than 1,000 years, when Kyoto was the capital of Japan. It hosts a spectacle in which participants dress in authentic attire from bygone eras, with some representing specific historical figures, and march through the city accompanied by *mikoshi*. Portraying Japanese history as far back as the 780s, *Jidai Matsuri* celebrates the 1100th anniversary after the relocation of Japan's capital to Kyoto and was first held in 1895. It is followed immediately by a 'fire festival' in the neighboring village of Kurama, meaning that Kyoto residents – or visitors to the city region – can enjoy two celebrations in a single day.

Autumn shrine festivals are a fundamental part of Japanese culture, not only preserving the nation's inimitable customs and traditions, but bringing them to life in dazzling displays that entertain and enlighten in equal measure. In 2020 our hope is that these colorful traditions can still shine, safely and responsibly.

ClassNK events:

- ◆ **SMM, HAMBURG, GERMANY, 2 - 5 FEBRUARY 2021**

- ◆ **SEA ASIA, SINGAPORE, 20 - 22 APRIL 2021**

- ◆ **NOR-SHIPPING, OSLO, NORWAY, 1 - 4 JUNE 2021**

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ClassNK is a major supporter of the Digital Era

While the maritime industry is reshaping its structure due to digitalization, ClassNK's role of ensuring the safety of ships and environmental protection as a third party organization remains the same. ClassNK is proactively applying digital technology to strengthen its services based on outcomes from a variety of research in areas including robots and analytic technology.

Further, ClassNK contributes to the digital transformation of the entire maritime industry by providing a platform for the collection and distribution of data. Together with industry players, ClassNK is promoting IoS-OP (www.shipdatacenter.com) consisting of clear rules for fair data use between data owners and users, along with a highly secured data center.

ClassNK
www.classnk.com