Technical Matters roundup.

Technical Insights from experts you can trust.



December 2020.



Introduction.

Technical Matters offers regular opinion and insight on a wide range of topics, from decarbonisation and digitalisation to safety and sustainability. In each article, contributors consider how new regulations, technologies and innovations can be pragmatically and safely applied, weighing up the pros and cons in each case, and focusing on practical, efficient application.

Recent articles have looked at issues including eCertification, fuel bunkering, remote technology, digital twinning and cyber security. In this roundup document, we share 13 Technical Matters articles published by our experts in 2020. As we look forward to 2021, we will develop new articles to provide the technical insights to keep you up-to-date, and to deliver the intelligence to support your investment and strategic decision-making.

How to use this document

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Maintaining your Inventory of Hazardous Materials – compilation is just the beginning.

By Jennifer Riley-James, Senior Ship Recycling Specialist



The 31 December 2020 regulatory deadline for Inventory of Hazardous Materials (IHM) requirements may be fast approaching, but it's not the end of the story. Far from it. This is a living and breathing document and implementing ongoing maintenance is crucial, as LR's Jennifer Riley-James, Senior Ship Recycling Specialist and Product Manager, explains.

The end of year deadline for compliance is hardly breaking news – regulations have been around since 2009, with the formal adoption of the IMO Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships (HKC). But it's only in recent years, with the phased entry of the 2013 EU SRR, that shipowners have really started engaging with the task of IHM compilation en-masse.

With many well on the way to compiling their IHM's to gain certification ahead of the deadline, the focus is shifting to how best to implement ongoing maintenance. These are, after all, documents that stay with ships

throughout their operational lifetime. So it's important to keep them up-to-date. Not only to ensure compliance but because a comprehensively compiled document minimises risks and potential liabilities, and does much to enhance the safety of ships' crews in the longer term.

With so much else to occupy minds (and resources) in marine, keeping this maintenance process simple is essential. Staying consistent – by using the same user-friendly IHM template across your fleet – is a great starting point.

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Here, LR can help by providing a standard, editable PDF that can be updated as many times as needed and easily stored/transferred due to its small file size. This takes care of the need to quickly update the IHM if any items onboard (which are, or could be, part of the ship's structure or fitted equipment), are added, removed or replaced.

These updates should be based on information from a completed Material Declaration (MD) and Supplier Declaration of Conformity (SDoC), requested from the supplier. To streamline this process, LR also offers carefully designed templates for these documents as part of our service - ensuring a simple and consistent approach for you and your suppliers.

It is also worth noting that the request for your suppliers to complete an MD and SDoC should be included specifically in your procurement policies.

Procurement Policies

A procurement policy should ideally:

 Request any items supplied to the ship are accompanied by a completed MD and SDoC as per Resolution MEPC.
269(68) – 2015 Guidelines for the Development of the Inventory of Hazardous Materials and the EMSA best practice guidance.

Make explicit reference to:

 Resolution MEPC.269(68) – 2015 Guidelines for the Development of the Inventory of Hazardous Materials to cover HKC.

- Regulation (EU) no 1257/2013 if inclusion of EU SRR hazards is required.
- The policy should preferably cover the hazards listed in both Appendix I and II of HKC and Annex I and II of EU SRR.

Note: a blanket statement included generically in your procurement policy stating that hazards must be restricted is not likely to be enough to meet IMO and EU requirements for IHM ongoing maintenance.

Of course, while implementation depends on the systems already in place for managing paperwork onboard vessels, our best practice advice is to integrate your new IHM maintenance process into Safety Management Systems by:

- Designating a person responsible for maintaining and updating the Inventory (this person may be employed ashore or on board).
- Ensuring the designated person has appropriate training, qualifications, knowledge and experience to perform their respective duties.
- Ensuring the designated person establishes and supervises a system to ensure the necessary updating of the Inventory in the event of new installation for any hazards present above the defined threshold values, and maintains the Inventory including dates of changes or new deleted entries based on information provided in the supplied MD and SDoC.

Material Declarations and Supplier Declarations of Conformity:

- MDs and SDoCs are required to be collected for all items brought onboard the ship that will or could be part of the ships structure and fitted equipment – even if they contain no hazardous materials. The IHM is all about building up a chain of positive and negative statements about what is onboard your ship, to facilitate safe and environmentally sound recycling at the end of operational life.
- Unique MD and SDoC should be requested for each individual equipment type brought onboard the ship.
- Multiple units of the same piece of equipment can be covered under a single MD and SDoC.

With IHM maintenance truly mission critical, and consistency the simplest way to make it happen, taking advantage of best practices and using the best available tools really will have a positive impact. Ensuring conformity with the legislative requirements becomes a swift and straightforward task, and helps ensure a smoother process when certification is renewed every 5 years.

For more details on the issues discussed here, and to see how we can continue to support your ongoing maintenance through our optional annual survey service, contact your local office today.

Published 28 April 2020.

LR meets shipping industry challenge by embracing live-streaming technology.

Throughout the COVID-19 crisis, ship operators have faced challenges in maintaining valid class and statutory certification, with surveyors and flag inspectors, and their own shore-based staff, unable to attend vessels for surveys, inspections and audits. But rapid adoption of remote technologies has demonstrated that surveyors can direct crew onboard and make better informed decisions. maintaining the highest technical and safety standards, while allowing world trade to continue unimpeded. Yiannis Fytilis, Lead Surveyor and Remote Survey Champion in LR's Southampton office, shares his experiences and explores the technical considerations of safely adopting remote survey methodologies.

The importance of remote survey methods has really come into focus over the last six months, with operators protecting their crews from possible infection and surveyors physically unable to reach vessels. Fortunately, remote survey is not new to LR and our surveying teams credit thousands of jobs remotely every year, typically based on a combination of static data such as photos and service engineer reports.

Of course, static data has its limitations. Therefore, the introduction of LR's new live-streaming video-audio tool, LR Remote, is a real step forward by providing an improved perspective onboard the vessel and enabling a broader range of surveys to be completed remotely. This has been absolutely essential during this period of disruption, and invaluable to a number of stakeholders throughout the industry – not just vessel operators, but also flag administrations and other regulators.

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In one particular instance, a vessel operator reported the development of a crack in the superstructure deck. This had been identified during the last sea passage and the operator requested LR undertake a remote inspection in conjunction with surveys for Special Survey postponement. Utilising its well established governance structure to support this type of request, LR was able to identify the items to focus on to enable the postponement using its remote survey methodology.

The through-thickness crack that had developed was a substantial length from the side of the vessel to the inboard termination, following an erection seam from new build. The gap that had formed between the plates was also significant. The LR Remote app, which was easy for the ship's crew to download and setup on either the vessel's V-sat enabled LAN network or the domestic 4G coverage, provided a much more thorough examination of the defect than would have been achievable with static photos. It was possible to identify the start and termination points, and explore above and below deck, to identify distortion in other structural members that would need to be rectified as part of the permanent repair.

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This process of planning for permanent repair was particularly important to the operator – not only to identify the steps to be followed, but also to understand the classification requirements. Indeed, when this type of conversation is facilitated remotely, it is significantly enhanced by having a live video-audio stream – so you can talk through the repair in detail while viewing the damage and marking up the steel as you go. All of which helps ensure repairs can be undertaken as efficiently and effectively as possible, minimising any further downtime for the vessel.

At this point it is important to mention the safety considerations. LR provides clear recommendations to our clients on performing remote surveys in a safe manner, and always discusses this with the client in the kick-off meeting before inspections have commenced. The survey was also able to continue using the LR Remote app for the general examination of items on exposed and partially-exposed decks. Again, the ability to direct the crew member onboard was key to enhancing the survey. Where previously static photos would have been provided to indicate overall condition, the live video-audio stream now enabled instructions to be relayed in real time, focusing in on specific areas of interest. For example, by gaining detailed views of windlass chocking arrangements or coaming, packing and cleat condition for hatches, a true 'general examination' equivalent to physical attendance can be supported – which is, of course, a pre-requisite for remote survey method acceptability.

Overall, this example, and the many others before and since, have proved the incredible value of remote survey tools when used in a safe manner and in the right application.

This is a real watershed moment for the industry. All stakeholders now recognise that investment in solutions to enable remote surveys throughout vessels, from the bilges to the fore mast, will be key to keeping trade moving in the future, whatever challenges we face.

With our new LR Remote solution, LR is preparing for that future, and is continually investing in, and adopting, advanced technologies to keep vessels trading around the world.

Published 22 May 2020.



Coping with the changing nature of risk.

We may only be halfway through the year but there is no question that everyone's abiding memory of 2020 will be the coronavirus outbreak. The ferocity of the COVID-19 pandemic has tested citizens, governments and businesses across the world and while we have endured global crises before, the nature of risk and how we should respond to it has changed.

In recent years, abnormal has become the new normal as geopolitical upheaval and the fallout from climate change is felt more intensely. Whether it be terrorism in the Middle East or bushfires down under, these shocks have become far more frequent and immediate due to the connected world we now live in. When they occur, they can really strike to the heart of how we run our companies. The speed and intensity of these incidents reminds us that we now live in hyperconnected and unpredictable world. **By James Pomeroy,** Group Health, Safety, Environmental & Security Director

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Businesses the world over are built on plans and while these can be effective for many areas of operation, crisis management requires more than a procedure telling people what to do. The ever-evolving nature of risk calls for understanding around the difference between having a plan and planning.

Many of us have had chunky manuals and operational guides thrust into our hands, which we have diligently digested and while they can set out best practice and support with checklists and communication cascades, these documents don't necessarily hold the answers as crises rarely conform to our best-laid plans. Planning, on the other hand, ensures we are equipped with the capability to diagnose a situation, apply what we have learned and find a solution and re-evaluate as and when necessary.

Planning requires that organisations empower and equip their people with skills that focus on agility, resilience and adaptability as well as an environment where people are trusted and have the confidence to act.

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Resilience and agility centre on building capacity in the system to absorb shocks, and fostering the ability to act quickly. Delegation and building trust across flatter decentralised teams is vital for ensuring a speedy crisis response and this relies on identifying a small number of people at the top, who can make decisions fast and cascade instructions. Failing to do this can hinder action as you could end up running the crisis by committee.

Adaptability is the ability to diagnose the problem and determine how best to respond to it in the moment. Using scenarios and modelling, teams can garner insights about potential outcomes and pitfalls during a crisis. These kinds of exercises – where there is no right or wrong answer - can help those on the frontline build muscle memory in terms of how they think and work as a team and give them the confidence to reappraise plans as is required. We can see this with airline pilots where the focus is not on voluminous plans, but helping the pilots build 'muscle memory' through simulators enabling them to respond to thousands of potential scenarios safely.

The challenge is that many businesses remain hierarchical but the world that we live in now requires different skillsets from those based on traditional crisis management. It's one that calls for tiered structures where teams on the ground are empowered to make the right decision in the moment using the information they have to hand, rather than waiting on those further removed from the crux of the situation to make decisions when details are constantly evolving.

It also involves knowing that 'prudent overreaction' is a virtue not a vice when it comes to protecting people, assets and the environment. Even though crises usually require a swift response, all decisions need care and consideration and culture of erring on the side of caution and prioritising safety is essential.

Above all, crises need to be managed in an environment of complete trust, with all teams sharing full information about what's worked and what's not worked so that lessons can be learned. For LR, with teams spread across the globe, the early lessons learned from the COVID-19 outbreak in Asia were invaluable and informed our actions in other locations. They enhanced our resilience and agility and the speed with which we could respond.

It's worth remembering that the line between success and failure can be arbitrary. Knowing the three or four things that should be carried forward as well as three or four things that might have gone wrong puts you on a stronger footing for next time and builds better situational adaptability. Given the uncertainties of what could lie ahead, planning and preparation should not be undervalued.

Published 25 June 2020.



The importance of cold flow properties when specifying marine fuels.

By Douglas Raitt, Regional Advisory Services Manager



It's now over seven months since IMO2020 came into force and it seems everything has gone smoothly. Certainly, LR's tests show almost universal compliance – with just four per cent of very low sulphur fuel oils (VLSFO), and less than two per cent of gas oils, being offspecification. But being on-spec doesn't always mean fuel is always on-point for use. In fact, in some instances, while marine fuel may be supplied to specification, it may not always be fit for purpose when it comes over the rail. Douglas Raitt, Regional Advisory Services Manager at Lloyd's Register looks at why it is critical for ship owners to order bunker fuel based on the suitability of its use, rather than the compliance of its sulphur content.

Cold flow properties are an important consideration when it comes to ensuring the safe and efficient use of marine fuels on board vessels. A lot of VLSFOs are highly paraffinic, with poor cold flow properties. This greatly impacts thermal heating management onboard ships. If not controlled effectively, fuel storage temperatures may accelerate fuel instability and impact shelf life and its fitness for purpose.

Storage and wax appearance

The introduction of VLSFO's poses a set of unique challenges for marine fuel management onboard ships. VLSFOs tend to be more paraffinic in nature than the majority of high sulphur fuel oils they replaced and feature increased wax content and generally lower viscosities. This limits stability and makes them more sensitive to thermal control demands – both heating and cooling.

With these challenges in mind, FOBAS identified fuel treatment during purification as the most critical area in conditioning the fuel. During purification the gravitational forces are multiplied, making them more likely to separate any denser crystallised waxes remaining – which can lead to excessive sludge deposition.

To better predict this sludge deposition, and to ensure the fuel temperature can resolve the waxes back into the fuel, FOBAS developed an in-house performance test method for lower viscosity, lower injection temperature fuels.

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The Sediment and Wax Precipitation Point (SWPP) test provides ship owners with the optimum purifier throughput temperature to prevent wax deposition during fuel treatment operation.

In very simple terms, while SWPP is broadly similar to the cold filter plugging point (CFPP) for distillate fuels, CFPP is suitable for detecting the point at which wax crystals become problematic in clear and bright fuels. In contrast, the SWPP can be used on darker opaque oils to detect the point at which combined sediment and wax crystals no longer become problematic.

The key point is that SWPP is a performance-based test to identify the critical temperatures to be maintained during purification, and indicates the temperature at which the wax will disappear into a liquid state.

Other wax measurement tests are offered on the market. The Wax Appearance Temperature (WAT) which is equivalent to Cloud Point (CP) for distillates and is used for dark opaque fuel, while the Wax Disappearance Temperature (WDT) is the temperature required to re-liquify the crystals. Both these are addressed by our combined SWPP performance test. WAT and WDT temperatures are higher than the pour point, which predicts pumpability of fuel.

In essence, although good to know, the practical significance of WAT and WDT in the management of marine fuels is limited. It should be noted that if WAT or WDT temperatures, are maintained for extended storage periods in the bunker tanks to keep all wax crystals in solution, this may lead to fuel overheating. In view of the thermal sensitivity of VLSFO's, this could then potentially accelerate instability. Therefore, wax crystals in fuel are better addressed in the higher temperature fuel conditioning unit (FCU), with fuel flow pumpability maintained by keeping fuels at least 10°C above the pour point only.

What should ship owners do?

Ship operators should be prudent in thermal management and not overheat fuel prematurely to avoid accelerating instability. Maintaining pumpability by only heating fuel 10°C above the pour point, and trusting that wax crystals will resolve themselves at higher temperatures in the fuel conditioning units, is key to peace of mind.

Published 29 July 2020.

Software conformity for critical safety systems.

In today's virtual world, hardware-based systems are increasingly being replaced by software applications. This marks a considerable step forward in terms of the design, development and delivery of critical marine and offshore safety systems.

A software-based approach is more flexible, easier to change and enables overthe-air (OTA) deployment, provisioning and evergreen updates. It also enables adaptions and iterations without device recalls or physical visits from engineers. But software systems are also more complex and, without the appropriate level of certification, should not be relied on to support today's safety solutions. By Peter Huntley-Hawkins, Principal Specialist

Peter Huntley-Hawkins, Principal Specialist at Lloyds' Register discusses the issues and the importance of LR's Software Conformity Assessment System (SCA).

The trend towards software-based applications

Promising a flexible answer to the random failures that have beset traditional marine and offshore control systems, the trend towards software-based applications offers very real advantages. Unlike hardware, software doesn't wear out or suffer from manufacturing defects. As above, software-only solutions can be remotely deployed and updated, and when developed in an open environment, can also provide a hardware agnostic option that can run on Commercial off the Shelf (COTS) platforms – which can considerably reduce costs.

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But they're not perfect. While they may not be subject to the same issues that have impacted hardware, there is little doubt that software systems are more complex. They are sensitive to small errors and, with the many discrete states that can be adopted, are hard to fully test.

Software failures typically arise during design and implementation activities, and can affect all units of the same design, under the same conditions. In short, a hardwired device may be defective because it's been damaged in transit. This would be an exception. If it's a software problem, every device will be subject to fail.

Which is why it is absolutely critical to ensure full assurance and control during the design phase, and then later during deployment or Over-the-Air (OTA) provisioning to avoid systematic errors and failures. This is, of course, even more critical should the software support onboard or portside safety systems.

Since 1994, LR's Software Conformity Assessment System (SCA) has provided a certification programme by ensuring that acceptable processes are applied throughout the development of the software. This includes the inspection of documents and records, testing and test witnessing – with assessments typically carried out at the developer's premises where the records reside.

LR may also recognise existing certificates or reports issued by other certification bodies or accredited testing laboratories where equivalence to LR's SCA can be shown. The SCA system does not insist on any particular software development methodology being adopted – only that the chosen methodology delivers a systematic approach to development. Here, it must deliver the required controlled and traceable product and the necessary testing and specification records exist and are held within an acceptable configuration management system. Compliance with a recognised National or International Standard for configuration management assists this process.

Agile development methodologies

While very popular, Agile development methodologies react against these formal lifecycle models and process-oriented approaches. The lack of overall product design and insufficient rules and guidance, combined with the lack of a product owner role (and corresponding lack of accountability), are just some of the shortcomings of this approach.

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That is not to say that software developed using Agile methodologies cannot be certified, however. Only that these are used in conjunction with a number of wraparound processes in order to achieve the required level of controllability and traceability. Certainly, when appropriately augmented, we have seen solutions developed using an Agile approach successfully used in applications to produce additional functionality in existing software.

It is also true that many serious software failures can also be traced back to inadequate requirements definition, rather than to deficiencies introduced in the later phases of the software development life cycle. Here, systematic techniques for requirements analysis are available to improve this critical task of collecting customer requirements and translating them into a form that can serve as a basis for the software project. Many computer tools exist to assist with this process.

Evolving technologies

As Artificial Intelligence (AI) and Adaptive Systems (AS) technologies evolve, we will see autonomous use cases evolve beyond the automotive sector and into marine. Indeed, we have already seen a number of proof of concept projects applied to autonomous ship control. In these emerging scenarios software design assurance alone will not be enough to assure the safe application of adaptive systems. Instead, defining and capturing system safety objectives as part of the design process, and making sure the adaptive system exhibits certain functional and safety properties, which can then be validated at system level, will be critical to assure safe operation.

It is certainly true that more reliance is now placed on verification by analysis or simulation rather than test, while use of multi-layered verification methods, involving a combination of test, analysis and simulation of models, is advocated too.

All of which adds up to a complex development and verification environment. However, with the inherent challenges posed by today's software-first approaches, assurance is critical. Here at LR, we can guide you through the testing process and, leveraging our Software Conformity Assessment System, provide a robust and internationally accepted certification for your software.

Published 24 August 2020.

IMO-compliant E-Certificate issuance gathers pace.

As digital technologies continue to transform the marine and offshore sectors, LR looks at the issuance of IMO-compliant electronic certificates (E-Certificates) for all Flag States wishing to authorise their use. Here, Jim Smith, Fleet Services Manager at LR Marine and Offshore, discusses the widespread efficiency benefits this digital option delivers.

As digital transformation gathers pace, the issuance of E-Certificates is a critically important step. Augmenting rather than replacing existing certificates, and designed to reflect the familiar look and feel of onboard physical records, this digital option offers a new level of convenience, efficiency and automation for ship owners, surveyors and others. Keeping track of the correct paperwork onboard, and keeping it updated and sharing the right information when it's needed, can be a challenge. By digitalising the certificates and storing them securely for access via the LR Class Direct platform, ship staff and technical managers can easily search for and share the required E-Certificates. This also eliminates the need to retain physical copies on board, and certificates can be amended without attendance where appropriate. The E-Certificates are available online, via the LR Verification Portal, to allow marine authorities including Port State Control to gain access in real time – simply by typing in the certificate's Unique Tracking Number.

The E-Certificates are available online, via the LR Verification Portal, to allow marine authorities including Port State Control to gain access in real time – simply by typing in the certificate's Unique Tracking Number.

With compliance key, all LR E-Certificates meet the legal standards set by the IMO. Our E-Certificates are issued

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in accordance with the IMO Facilitation Committee (FAL) and its approved "Guidelines for the Use of Electronic Certificates" (IMO Circular FAL.5/Circ.39/Rev.2).

Each E-certificate is securely stored and protected from unauthorised editing to prevent fraud and to ensure their authenticity – protections that are absolutely critical in the light of ever more sophisticated cyberattacks.

In addition to this simplicity and assurance, LR's E-Certificates make things easier for surveyors. Following a survey or audit, the E-Certificates are created and digitally signed and reflect the details held in LR's MAST reporting system – vessel name, port of origin, IMO number, certification status and so on. As the vessel moves through its life and details change, these MAST register book details are updated in the creation of new E-Certificates.

This is an automated process that not only speeds up certificate endorsement and re-issue, it also eliminates the potential for manual errors. Previously issued trading certificate records are also being migrated to E-Certificates as part of the process of switching on a flag's E-Certificates without the need for further surveyor action.

As we accelerate into an increasingly virtual future, LR continues to work with clients, regulators and the wider industry to adapt and adopt the very latest digital technologies – delivering solutions that address real world challenges and support truly transformative outcomes for all.

Published 16 September 2020.

Safety, convenience and innovation in Remote Surveys.

By Thomas Aschert Remote Survey Globa Operations Manager

During the first months of the global coronavirus pandemic, the use of remote surveys and inspection techniques accelerated beyond all expectations. Here, Thomas Aschert, Remote Survey Global Operations Manager, Marine & Offshore, discusses how LR intends to continue to innovate in this area, and why he believes we are just scratching the surface of what is possible.

For many operators, remote surveys have been more a question of necessity than choice over the past six months or so. Crews needed to be protected from possible infection, and travel restrictions prevented LR surveyors from physically reaching vessels.

As so often happens, in adversity comes invention. During this unprecedented period, LR was able to take a major step forward by supplementing our traditional remote survey practices with live audio-video streaming capabilities. This not only improved our ability to identify problems onboard, but allowed a broader range of surveys to be completed. I am pleased to say that feedback from operators and crews has been very positive

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This is just the beginning. To date, our focus has been on existing ships, especially cruise ships with good Wi-Fi capabilities, that have been unable to operate during lock down. But we are also seeing growing demand from across the marine and offshore supply chains, and we are already working closely with some clients, to understand where we can add value, without compromising quality or safety and defining our approach to meet their needs.

One such opportunity we are exploring is the creation of a series of hybrid services. In one potential use case – for vessels with little time in port – our surveyors would undertake a physical, onboard survey and use our remote capabilities to complete administrative tasks such as ensuring the integrity of certificates and documentation. By taking administration off the vessel we will be able to reduce disruption and allow crews to focus on cargo operations, host other technicians or complete the many other tasks required when in port.

In another example, we may look to make physical visits to operator headquarters to certify the paperwork of multiple ships, and conduct remote surveys of vessels at sea from these locations. This will enable owners to be physically present (in the room) during surveys without having to join via video link or us all being onboard. Again, the speed and economies of scale we achieve by completing paperwork onshore, and remote surveys onboard will be significant.

We are working hard, and using surveyor's feedback, to refine and improve our processes. We already understand that remote surveys can take longer than those on-board and we are looking to simplify checklists in MAST so surveyors can spend less time on form filling and more time applying their expertise. We are also working with our technical governance and fleet services teams to understand the full implications on things like Port State Control inspections following remote surveys.

In a connected point, the LR Remote Survey Champions are also investigating opportunities to enhance our remote survey capability and increase safety of crew members who help us conduct remote surveys. Instead of having to carry the video device (typically a high end smartphone), body-worn cameras so crew can keep both hands free while streaming video back to our surveyors.

We have only just scratched the surface of what is possible. LR's remote survey team are experimenting and learning all the time. Today, we are partnering with trusted clients to trial more in-depth annual surveys to see which elements are appropriate for remote inspection (and which are not). LR is even running remote and onboard surveys simultaneously on the same vessel so we can compare results and further develop best practices.

There is no doubt that the digitisation of our industry has taken a big leap forward as a result of the global pandemic, and there is a lot of work still to be done to fully embed, and develop, new approaches and processes for 'the new norm'. It's an exciting time and we value all feedback and suggestions from our clients.

Published 25 September 2020.

As technology continues to evolve, a less prescriptive future for shipping maintenance is coming into view.

By Usman Muhammad, Product Manager - Fuel Advisory

Marine diesel engines have been the prime movers for merchant ships for more than a century. They are robust, reliable and have proven their worth across hundreds of thousands of nautical miles. But with more attention now focused on fuel oils and engines as the world fleet transitions from HSFO (high sulphur fuel oil) to VLSFO (very low sulphur fuel oil), a lack of effective monitoring may be storing up problems for the future. Usman Muhammad, Product Manager - Fuel Advisory at LR, looks at the issues and explores what action owners can take to avoid costly failures.

Around 84% of the world fleet, ships >10,000 gross tonnage, uses the crosshead type low speed, two-stroke engines for main propulsion. The main advantages of these engines include being reversible, uniflowscavenged, turbocharged and able to provide thermal efficiency and reliability through having fewer moving parts. Moreover, the robustness of these large, low speed engines has always enabled them to burn cheap heavy fuel oils of varying quality.

Despite the successful operation of these engines over the past few decades, there have inevitably been incidents of loss of propulsion due to main engine failures. These incidents, although few and far between, represent a significant economic loss for ship operators – not only from direct maintenance costs, but also from indirect costs such as off hire and port fees that can run into millions of dollars. In its 2018 annual report, the Swedish Club reported that the cost of machinery claims for the period 2015-2017 was around USD 384 million. Main engine damage was the most expensive category, accounting for 34% of total machinery claims.

Although there has been continuous efforts to improve the diagnostic capability to detect incipient failures before they occur, more awareness is needed as to the importance and benefits in utilising available machinery condition monitoring tools. Research indicates that only 5% of the shipping industry uses some form of condition monitoring for maintenance management. When compared to other industries, this figure is quite low.

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Determining and optimising the combustion performance within large two-stroke engines holds the key to improving overall engine efficiency. Fuel combustion is a complex chemical/physical reaction and has been an area of intense research over the years. However, inconsistency in the composition of residual marine fuels makes it very difficult to predict engine component wear rates and failure mode.

Since the implementation of MARPOL Annex VI regulation 14.1.3 from 1st January 2020, Lloyd's Register FOBAS have seen an upsurge in combustion-related incidents resulting in cylinder liner and piston ring damages of large twostroke engines during the period that the world fleet started transitioning from high sulphur fuel oil (HSFO – max 3.5%) to very low sulphur fuels (VLSFO – max 0.50%).

There are several factors which can influence the combustion in an engine, and a holistic approach is needed to evaluate all the operational information to connect the dots. For example, in the recent spate of cylinder component damage incidents reported by ships since the beginning of this year, a clear contributing factor was the change of fuel oil from HSFO to VLSFO. However, our investigations revealed that poor fuel ignition and combustion characteristics were unlikely to have been the main reason for these incidents. In fact, most VLSFO showed better ignition quality compared to HSFO during lab testing.

Further analysis identified that damage was caused by a number of influencing factors which include any combination of the following: the applied cylinder oil quality; poor maintenance; lack of operational adjustments; excessive or insufficient cylinder oil feed rate; not following OEM guidance on ring selection. This combination of influencing factors highlights the critical importance of utilising a multifaceted approach in which ship operators consult engine manufacturers and fuel testing and advisory services, and ensure best practice approaches are followed on-board.

In light of the diversity of composition and varying fuel quality of these VLSFOs, the use of an appropriate condition monitoring tool could further reduce the risk of breakdown scenarios through the diagnostic capability of picking up any incipient failure.

Here at LR, FOBAS provides lube oil analysis and, for more comprehensive engine condition monitoring, our FOBAS Engine Assessment Programme (FEAP) can be used to monitor two-stroke engine performance. Through regular sampling and data collection, the FEAP service is specifically designed to highlight and alert the ship to the health of components within the combustion chamber in order for the on-board staff to take appropriate mitigating action – to avoid the potential operational and commercial issues.

Please contact us for further information. One of our experts will be pleased to discuss the process and further explain the FEAP service.

Supporting sources:

- 1. https://maritime.ihs.com
- 2. https://www.swedishclub.com/media_upload/files/ Loss%20Prevention/Main%20Engine%20Damage/ TSC-main-engine-WEB2020.pdf
- 3. IMarEST conference (2015) London. https://www.imarest.org/conference-proceedings

Published 15 October 2020.

Introducing the Urgent Survey Request service, a new way for marine operators to secure

emergency survey support.

With almost 3,000 maritime incidents recorded in the European Union alone last year, the need for ship operators to secure rapid survey support during an urgent situation remains strong. Here, Mark Haskell, LR's Area Service Delivery Manager for Marine & Offshore in the Americas, discusses the launch of the Urgent Survey Request service, a dedicated 24/7, 365-day a year support line that allows ships operators, managers and masters to gain the survey support they require fast. **By Mark Haskell,** Area Service Delivery Manager Marine & Offshore (Americas)

It's an unfortunate reality that even the most wellmaintained of maritime vessels can face interrupted operations resulting from unforeseen incidents. From structural issues, such as equipment breakdowns and collisions, through to unexpected decisions by port state control authorities, emergency occurrences can cause significant disruption to an otherwise uneventful voyage.

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Naturally, the speed at which an operator is able to respond to an emergency can be a major factor in determining the ultimate severity of that event. The faster the reaction, the more likely it is that long-term damage or danger to crew can be limited. From a commercial standpoint, the ability to bring a vessel back to operational readiness as quickly as possible is a critical factor in mitigating financial risk.

In the event of an emergency, one of the main priorities for any operator will be to secure the services of a surveyor to conduct an urgent assessment of the vessel. While this might be a relatively simple task during "normal business hours", not that such things apply to maritime fleets, raising an incident out of hours can be more difficult – leading to crucial time wasted as operators and masters search for an appropriate point of contact.

With this in mind, and as part of an ongoing commitment to the continual improvement of our services, LR has launched a dedicated Urgent Survey Request line. Offering 365-day a year support for urgent survey requests, the service allows LR clients anywhere in the world to schedule surveyor assistance via a single contact number that runs 24 hours a day. The first contact is used to establish the vessel's location and the category of the incident, with a technical expert providing a call back within 30 minutes of LR receiving the initial request. While incidents occurring within a territory's normal business hours can continue to be addressed using LR Class Direct or by contacting the appropriate local office, the Urgent Survey Request service provides a fast and convenient way for operators to request out-of-hours assistance across three scenarios:

- Time-dependent surveys, such as those required to secure charter requirements, or port entry requirements that have been imposed upon arrival at a destination.
- Safety-related surveys that cover damage or statutory issues that require immediate assistance before the vessel can continue to operate.
- Port State Control (PSC) requirements that need to be met before a ship can be cleared for continued service.

From speaking to many of our marine clients, we understand just how important it is for them to be able to request surveyor assistance as swiftly and effortlessly as possible during an emergency or other urgent event. The Urgent Survey Request service has been created to provide the reassurance needed that LR's surveyors are reachable day and night across the globe, giving operators the agility and efficiency required in order to bring a vessel back to full operational status as soon as possible.

The Urgent Survey Request line is already live, and we would like to encourage any LR clients with a future out-of-hours survey need to reach us via +44 208 052 1111.

Published 4 November 2020.

Digital twins and the path to a smarter structural health future.

Digital twinning is the practice of creating a virtual reproduction of a physical asset and using expert intelligence to develop real-time predictions about its future performance. In this article, Vaibhav Parsoya, Intrapreneur – Digital Solutions Innovation, Marine & Offshore at LR, looks at the growing appetite for digital twins in offshore, and why the marine industry has just as much to gain from a fivedimensional future. The concept of digital twins is not a new one. First applied in a manufacturing context by the Florida Institute of Technology's Michael Grieves in 2002, the idea that objects would one day have manipulable and interactive digital counterparts stretches back even further, to the early 1990s.

There are many different definitions for what constitutes a digital twin; my personal belief is that some degree of dimensional categorisation is required. Three-dimensional (3D) models are simply static, albeit virtual, representations of an object, and 4D models – even with the addition of information on how that object may change over time – also fail to capture the essence of digital twinning.

True digital twins require a fifth dimension to be added, one in which expert intelligence is also digitally modelled and applied to the virtual object, allowing useful By Vaibhav Parsoya, Intrapreneur - Digital Solutions Innovation

and accurate forecasts to be made on how its physical counterpart will fare in the future. In basic terms, the virtual twin lives an identical life to that of its real-world partner, providing human operators with vital information about the potential performance of that object over the duration of its lifecycle.

Naturally, there are many potential applications for this technology across both the marine and offshore industries, with one of the strongest use cases surrounding structural health management (SHM). And while the offshore industry has been actively looking to apply digital twinning to both floating and fixed oil and gas assets (and, in some limited instances, to offshore renewable platforms), marine operators have been rather more reserved in their pursuit of its potential benefits. Demand to date has come primarily from non-commercial entities – marine navies – and has focused predominantly on only the highest-value assets.

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Digital Twin

This reticence is somewhat understandable. As with all emergent technology, digital twinning comes with a relatively high barrier to entry in terms of investment, and a period of optimisation and learning can be necessary in order to generate a suitable return. Significant cultural shifts can also be needed, commercial, technical, and social realignment particularly important in organisations where fixed calendar/cycle based maintenance practices are already deeply embedded. Nonetheless, digital twins represent a considerable opportunity for commercial marine and offshore operators to fundamentally rethink the way in which they monitor and maintain the long-term performance of their assets – and capitalise on some major opportunities as a result.

At LR, we see three key benefits from the deployment of digital twins:

They can make inspection, maintenance, and repair more focused. By using predictive data generated by the virtualised asset, operators have the opportunity to move from calendar-based, prescriptive maintenance schedules to condition-based inspection and repair. This has obvious positive implications for factors including repair and replacement costs, asset availability, enhanced safety, and reduced interruption to normal operations.

They reduce the time between data collection and decision making. Historically, data about an asset's performance would usually only become available to R&D personnel at the end of a project or maintenance cycle. With digital twins, which can run complex modelling exercises almost instantaneously, this time can be reduced from months to just a matter of days.

They encourage greater collaboration between stakeholders. By offering a real-time look at the likely condition of an asset, compliance partners and regulatory bodies can use digital twins as a single source of truth that helps them make faster and better-informed decisions about whether an asset should be cleared for continued operation.

This strategic approach to SHM is evident in a new project being undertaken by LR for Bluewater, a designer and operator of Floating Production, Storage, and Offloading (FPSO) units. Here, the digital twin developed by LR will utilise a combination of multi-physics models, sensor information, and unit design data in order to determine the global and fatigue hull strength of Bluewater's Glas Dowr FPSO. By doing so, it will provide Bluewater with the ability to predict structural performance prior to physical redeployment.

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Digital twins represent an evolution in the offshore and marine industries' ability to maintain the long-term viability of high-value assets. By moving from prescriptive, schedulebased maintenance cycles to condition-based repairs that use sophisticated, real-time modelling, operators have the chance to reframe maintenance with SHM in the context of Industry 4.0.

So, how do operators move from where they are today to realising the full value of digital twin technologies tomorrow? As above, this is a strategic activity, and one that should be undertaken in stages and with an experienced and trusted partner. Here at LR, we recommend the following approach:

Digital Twin 'Readiness'. This is the initial investigation phase conducted by LR. We begin by working with the customer to understand everything from the business objective to the more technical elements of data availability and quality. Here, all stakeholders including ship designers, maintenance teams, measurement/instrumentation suppliers and so on, work together to ensure we're ready for the next step. Digital Twin 'Set Up. This is where the digital twin is built and initial training is carried out to ensure everything is aligned to the business and technical objectives identified in the readiness stage. Once complete, the digital twin is 'commissioned' and begins leveraging the live data and 'learning' during the asset's live operations.

Digital Twin 'Live'. This is where the digital twin increases its fidelity and starts delivering back value in terms of reduced operational cost, more focused inspections, and dramatic reductions in human intervention.

With the ultimate objective of SHM being to ensure the safety and usability of an asset, digital twins have a huge role to play and present an opportunity to do it faster, more reliably, and with the bare minimum of asset downtime.

Published 11 November 2020.

Today's fuel, tomorrow's challenge? Methane slip and the implications for LNG-fuelled shipping.

With operators looking to adopt alternative fuels, and boost their green credentials with LNG projects and gas-fuelled ships, Panos Mitrou – Global Gas Segment Manager at Lloyd's Register Marine & Offshore – explores the political and environmental aspects of methane, why some technologies are better than others in controlling methane slip, and the need for a long-term solution to the emissions challenge.

The use of liquid natural gas (LNG) as a marine fuel is a complex, and potentially controversial, issue. While some parties have championed LNG as a way to dramatically reduce well-to-wake greenhouse gas emissions, others have disputed this assertion, noting that reductions of this kind apply only to two-stroke, high-pressure engines, and that methane emissions from LNG-fuelled vessels are potentially equal to – if not higher than – those from marine conventional fuel powered ships.

Methane emissions have long been tied to the use of LNG in shipping. Even as far back as 2013, concerns were growing that, thanks to stricter regulations regarding sulphur emissions, the marine industry might be manoeuvring towards widespread use of LNG without a full understanding of the environmental consequences.

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In May 2019, the International Maritime Organisation (IMO) tabled "further consider concrete proposals to reduce methane slip" as one of the issues to be discussed as part of its working sessions later that year. In spite of this renewed focus on methane though, no regulatory requirements have yet been imposed on either operators or manufacturers that provide them with a suitable standards and incentive to mitigate methane slip.

Part of the complexity here revolves around the subtle differences between methane slip and more general day-to-day methane emissions resulting from routine activities such as bunkering or fuel type changes. From the disconnection of dry couplings through to fugitive emissions generated by vibrating or malfunctioning safety valves, the normal operation of a LNG-powered vessel can generate minor release of methane to some degree. And, depending on the functionality of a vessel's systems, venting of methane gas into a "safe place" (i.e. the natural environment) will likely be required too.

Methane slip differs from these more widely accepted emissions in that it results directly from the performance of the engine itself. Either by leakage through piston rings, or as a result of insufficient combustion, methane slip occurs when gas is emitted unburned from the engine. Because it is unplanned for and, thus, largely unmeasured, it is generally seen as a greater environmental threat than the planned emissions detailed above.

Certain engine types are undoubtedly better at controlling methane slip than others. Two-stroke cycle diesel engines and gas turbines produce minimal amounts of slip, particularly when compared with Otto cycle four-stroke engines operating in highly transient conditions. Crucially,

even for those engines at the higher end of the methane slip scale, substantial progress has been made in recent years in remediating that leakage and new technologies will undoubtedly mitigate that risk further still.

The major issue though is not one of technological capability. Many marine engine manufacturers are actively seeking opportunities to introduce methane slip countermeasures into future engine designs. Instead, the problem is largely one of incentivisation; research and development carries a cost, one that manufacturers would need to pass on to operators. But without the regulatory or societal impetus to explore those methane slip-reducing technologies, they have no compelling reason to do so.

In the short-term, operators have the ability to alleviate some of the issues associated with LNG via a combination of process and technology. The use of fixed-arm connections during bunkering is more efficient than hoses, for instance, and capacity advancements could help to reduce leakage by reducing the frequency with which refuelling occurs. And at the regulatory level, even a small element of incentivisation for capturing and oxidising methane emissions rather than releasing them into the atmosphere would likely make a substantial contribution.

Ultimately, the long-term burden of change may fall to manufacturers and operators as well. General concern

about methane emissions may be demonstrably lower than other marine-related issues today – particularly in comparison to the visible damage caused by something like a crude oil leak – but growing environmental awareness means that this is unlikely to remain the case for long. Incoming directives from the European Union, which include carbon pricing and emissions trading schemes for shipping are likely to force the issue further.

More than anything, the decision to proactively tackle methane slip presents a genuine opportunity for marine operators to demonstrate their value as responsible corporate citizens. Recent years have served to highlight the enduring importance of reputation and brand, and taking action on methane slip – and emissions more generally – provides operators and engine manufacturers alike with a chance to pre-emptively answer their critics, reducing emissions through choice rather than regulatory demand.

Over the past decade, LNG has proven to be a powerful and versatile alternative to traditional marine fuels. It may not be the ultimate solution, but it is the best available. The priority going forwards must be on ensuring that it remains good not just for operators, but for the world as a whole too.

Published 11 November 2020.

For offshore operators, Technical Integrity Verification offers an assured path to

long-term excellence.

In territories where offshore regulation is less prescriptive, operators have limited guidance around safety and performance standards beyond their own prior experience. Technical Integrity Verification (TIV) services can help to provide the assurance needed, but can also provoke concerns about unnecessary expense and over-regulation. In this article, Colin McKenzie, Senior Project Manager at LR Marine and Offshore, explains the many benefits of TIV, and why its value goes far beyond just compliance.

No matter whether you work solely in-country or across multiple territories, offshore regulation can be difficult to navigate. In the UK and US, where tragedies such as Piper Alpha and Deepwater Horizon made international headlines, governments have introduced stringent legislation in order to limit the possibility of such events occurring again. In other locations, particularly emerging markets, regulation is less well developed.

This absence of a unified set of guidelines requires operators to define standards of safety, environmental protection, and more. In some cases, oil and gas companies have tried to take legislation such as that laid down by the UK Health & Safety Executive and US Bureau of Safety and Environmental Enforcement and apply the principles elsewhere. The results have typically been poor. While the intention is to introduce a goal setting and flexible framework, all to often it reverts to being a prescriptive regime that fails to map to the specific in-country environment or requirements.

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Technical Integrity Verification (TIV) schemes were established in an effort to bridge that gap, providing operators and their stakeholders with the assurance that they are following good practice when it comes to the construction and performance of their assets. In essence, they provide a guarantee of responsible behaviour even when no legal requirement for that guarantee exists.

In spite of the focus on assurance, though, TIVs haven't always been perceived in a positive light. Common concerns are that they can be over-prescriptive, introduce new obstacles that can only be overcome at greater expense, and focus on the negative or "non-compliant" aspects of an operation rather than those that meet the determined standard.

In our experience, which includes long-running programmes providing Independent Verification Body (IVB) services to Shell and the North Caspian Operating Company, nothing could be further from the truth. TIVs are not there to create unnecessary barriers. Instead, they give our clients the reassurance that they are doing everything they can to limit risk exposure, maximise performance and productivity, and to address the very specific project requirements in the territory within which they operate.

One of the main factors to address is the technical risk inherent in today's operations. Many sites today are constructed in multi-risk environments that operators may not have encountered in combination, and the cost of failure for a single element may be catastrophic. TIVs can offer the scrutiny needed to ensure that no such issues occur and that scrutiny stretches all the way from the initial specification and purchase of parts through to physical certification of their authenticity and implementation. Another key benefit of TIVs is that they provide a standard of integrity as defined by a third party. When several stakeholders are involved, this can help to ensure the smooth management of a project; rather than one dominant stakeholder dictating the requirements, or differing viewpoints resulting in a slowdown, TIVs offer an element of neutrality that all parties can agree on as a minimum requirement.

From a reputational standpoint, TIVs can provide a major safeguard against the damage caused by accident or failure. From assuring local communities that you are following – or even leading on – best practice, to maintaining a global standard even where there is no in-territory requirement to do so, TIVs ensure that operators and their shareholders can rest easy in the knowledge that they have done right by the nations in which they work. TIVs can have a positive impact on long-term performance. By encouraging the minimisation of environmental and safety risk, TIVs also protect operational efficiency – dramatically reducing the likelihood of a gap in operation as the result of an incident. Moreover, the "verification" that a TIV can provide goes beyond just one moment in time; as professionals, we are trained to look at the long-term performance of a project that starts from the moment it is conceived and stretches far into the future.

At LR, we believe that TIVs should not be seen as a barrier but as an enabler. Rather than limiting or hampering what they can achieve, they in fact provide a flexible, marketsensitive springboard from which oil and gas companies can refine and revolutionise the potential of their operations

Published 26 November 2020.

Should compliance or strategy drive security policy in marine and offshore?

With the IMO cyber security deadline fast approaching, the issue of security is high on the agenda for owners and operators across marine and offshore. But, as Ben Densham, Chief Technology Officer at Nettitude explains, compliance is only part of the story and shouldn't be the primary driver for security policy. Here, we look at the issues and see how LR and Nettitude's Cyber Security ShipRight Procedures can help deliver a more strategic approach.

Nearly four years on from the issuance of IMO's Guidelines for Maritime Security Management, the deadline is upon us. From the 1st January 2021, administrations will be looking to owners and operators to demonstrate that action has been taken in implementing the necessary cyber security measures in their Documents of Compliance.

While these remain 'strong recommendations' at present, there's no doubt that Flag Authorities have got behind the proposals, with most looking for some evidence of adoption. Not just in terms of developing an initial plan, but in demonstrating that those plans are executed, risks are being addressed and wider cyber risk strategies are evolving. Strategy, security or compliance?

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To my mind, this 'strategy' point is the most important. Here at Nettitude, we consult across the industry spectrum – in marine and offshore, critical national infrastructure, financial services and others – to help clients mitigate cyber risk. While there are certainly differences in levels of regulation, the precise nature of the threats and so on in each industry, the one constant is the need to plan ahead.

Cyber-attacks are continually growing in number and sophistication, while the push towards digital transformation is increasing the attack surface as organisations become ever more connected. In this fast paced arena, an eye on the future and having an effective, long term strategy is critical to protecting your operations.

We should also be thinking about security in broader terms. Compliance with cyber regulations is critical for any regulated organisation, but it won't always mean the business is protected from the multiplicity of emerging threats. And, what happens when regulations are unclear or, as in the case in marine and offshore, are more recommendations than obligations?

While it's certainly important to demonstrate adherence to IMO's 2021 guidance in the shorter term, the focus should be on developing cyber resiliency across the organisation. In this way, by bringing information security, business continuity and operational resilience together, organisations can ensure relevant protections and policies are in place to continually adapt to the dynamic threats they face. In short, security is more effective when it's an ongoing state of being, rather than a 'point in time' paper assessment.

The challenges of securing cutting edge and legacy

The marine and offshore sector is a great case in point. Vessels and assets being designed and built today will have operating lives of 30-40 years, and are increasingly sophisticated, connected (and autonomous). While we have a clear idea of the type of attacks these vessels will face in the near term, it's impossible to predict, with any level of certainty, what they'll face in a decade or two's time. Neither can we accurately anticipate what rules and regulations will be issued to address these emerging threats. It makes sense then to develop an agile and flexible cyber resiliency strategy that's capable of addressing both now and the next.

Focusing on two key areas, these comprehensive assessments aim to provide effective cyber risk management in design and construction, and during the in-service phase, to:

- Ensure technical designs and architecture proposals for new builds and refits consider maritime cyber security requirements at an early stage.
- Address the real risks relating to cyber and increasing connectivity.
- Allow assessments to be evidence-based, demonstrating outcomes that are reached.
- Be as pragmatic as possible for end clients working on upgrades or refits, particularly in legacy environments where equipment is built to last decades in remote scenarios.
- Include an audit process aligned to ISO 19011 and based around passive audit techniques.

But asset owners and operators aren't starting from a blank sheet of paper. We have multiple generations of vessels operating today. While the level of threat will be significantly lower for these less-digital assets, there will be risks – particularly as assets are modified and go for re-fit. So, it's important to look back as well, and take appropriate remedial action as required.

The impact of Cyber Security ShipRight Procedures

All of this is easier said than done, of course. Cyber risk management is a complex field. Simply understanding the threat profile of your vessels, assets and wider corporate environment is a challenging task in itself. To offer support, Nettitude and Lloyd's Register have created Cyber Security ShipRight Procedures, part of our wider ShipRight Procedures, with the aim of simplifying the process and providing the assurance the industry needs.

Launched in 2019, and updated in 2020, our Cyber Security ShipRight Procedures are designed to support organisations across the marine and offshore ecosystem – owners and operators, component and equipment manufacturers, shipbuilders and shipyards.

Built with the controls that need to be evidenced in order to meet Class Descriptive Note (DN) requirements, our in-service assessments measure the cyber security maturity of an asset's on-board processes and controls. Different levels are uncovered: Established confirms a minimum standard of good; Enhanced confirms that security best practices are being followed; Accomplished

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highlights an ability to manage high level threat; Optimised identifies very mature environments where cyber threats are high (for example, in naval or autonomous vessel scenarios).

It is important to note that the design and construction assessments demonstrate designed capability. Vessels may not then operate at these levels (as assessed under in-service procedures), rather this shows they have the potential to do so. Ultimately, this is all about providing a true assessment of cyber security capability to inform both operational and strategic decision-making.

An unconventional approach

In contrast to more traditional assessments, our Cyber Security ShipRight Procedures aim to avoid being too prescriptive. With safety the key priority, for example, it's not practical to have individual secure password logins to certain bridge control systems – as these must remain accessible at all time. Our approach, therefore, is to measure our assessments on outcomes rather than on whether a particular technical control is implemented. As long as crews can demonstrate an understanding of the risk and how it is being managed in another way, that is good enough.

Similarly, if vessels are already following established industry standards from organisations such as NIST or ISO, these can be incorporated into our assessments thereby avoiding operators having to double up on regulations or re-invent the wheel.

Securing marine and offshore today and tomorrow

Cyber risk management in general, and Cyber Security ShipRight procedures in particular, are not limited to owners and operators. Here at Nettitude, we are having an increasing number of conversations with equipment vendors, ship builders and shipyards around this issue. Indeed, a growing number of yards are specifying an LR Cyber Security ShipRight certification when selecting equipment vendors – both to understand the levels of security within components, and to offer clients the assurance that security is built in, rather than bolted on, to their new asset.

Ultimately, cyber security is a journey and we recognise that different operators, manufacturers and ship builders have different security objectives, are at different levels of maturity and, of course, have different levels of cyber risk management expertise within their organisations.

Here at Nettitude, we are able to meet our clients wherever they are on this journey – whether we are providing services to help hit those regulatory goals, or providing ShipRight procedures as the catalyst for wider and longer term strategic assurance.

Published 7 December 2020.

About the Authors.

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Yiannis Fytilis is Lead Surveyor for LR's Marine & Offshore Operations in our Southampton office and a Remote Survey Lead in UK&I. Responsible for the effective delivery of survey services and provision of technical support within the South of UK, he also conducts remote surveys on ships offshore. Yiannis joined LR in 2013 and has extensive previous survey experience of new construction and ships in service with other IACS Classification Societies.

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Jennifer Riley-James is the Senior Ship Recycling Specialist for the LR and is responsible for the development and management of LR's ship recycling services, including IHM and end of life. She also represents LR recycling interests on several external bodies. UK based, Jennifer joined LR in 2015 with a background in research, science and policy.

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Read Douglas' Article

Douglas Raitt is Regional Advisory Services Manager at LR. Having joined LR in 2005 to lead our Fuel Oil Bunkering Advisory Services' business, Douglas is now our Regional Advisory Services Manager for Asia dealing with the non-class services LR offers the marine industry. An expert in marine fuels, Douglas is also a leading specialist advisor on alternative fuels such as methanol, LNG and bio as well as general decarbonisation projects.

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Peter Huntley-Hawkins is Principal Specialist and Team Lead for Electrical and Instrumentation in the UK&I Technical Support Office. Responsible for electrotechnical design appraisal work within Marine & Offshore and the delivery of design support services to external clients, Peter is an experienced SCA assessor. He also undertakes the certification of Fire and Gas Detection and Navigational Equipment as well as Software Based Control Systems for clients.

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Read Jim's Article

Jim Smith is Head of Fleet Services, the section of LR which supports assets through their life as the core of LR's classification and marine management systems business. He is dedicated to applying our professional knowledge in new and existing areas to maximise benefits for our clients. Prior to taking up the role in 2018, Jim was Regional Marine Manager for North Asia.

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Thomas Aschert is LR's Remote Survey Global Operations Manager. He works with the global team to improve and further develop our remote technology capabilities. A master mariner, with extensive marine engineering field surveying experience, Thomas joined LR in 1998 and is an ISO 9001 Lead Assessor.

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Colin McKenzie is Senior Project Manager at LR. Colin is responsible for managing large and complex compliance projects. With 18 years experience in the nuclear and offshore oil and gas energy industries, he has a detailed working knowledge of UKCS oil and gas legislation and regulatory requirements. Colin is now focused on enhancing LR's Technical Integrity Verification service delivery.

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Read Usman's Article

Usman Muhammad is a Product Manager for our fuel advisory business FOBAS (Fuel Oil Bunker Analysis and Advisory Service). Responsible for providing technical advice on fuel matters and performing complex machinery failure investigations, Usman is a specialist in alternative marine fuels, environmental legislation and compliance options. He represents LR FOBAS at major international industry forums, including the CIMAC and ISO marine fuel and lubes working groups.

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Read Panos' Article (

Panos Mitrou is LR's Gas Technology Segment Manager. He is responsible for our seabourne gas supply chain and gas floating solutions. Based in Piraeus, he has initiated a number of alternative fuel projects including Poseidon Med, a cross-border European project introducing LNG bunkering in Eastern Mediterranean maritime transportation. Having worked at LR for 15 years, during his tenure at our Piraeus Technical Support Office Panos was involved in a number of major statutory reviews, including BWM, MARPOL, and the IBC and IGC Codes.

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Mark Haskell is the Service Delivery Manager for Marine & Offshore in the Americas, responsible for operations in the area. A naval architect by training, Mark joined LR in 1998 and has held surveyor roles in Europe, Asia and the Middle East, transitioning into operational management before moving to the Americas.

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Vaibhav Parsoya is an LR Intrapreneur. Working in the LR Innovation Team, Vaibhav is responsible for creating Digital Twin solutions that will deliver enhanced safety, productivity, and better asset utilisation for our clients. Joining LR as a Naval Architect, Vaibhav has vast experience of solving complex and unique engineering problems in the marine and offshore industry.

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James Pomeroy is Group HSES Director for LR and responsible for health, safety, environmental and security management across LR's global operations. With 25 years of experience leading HSES programmes that enhance human performance and safety culture, James holds an LLM in international environmental law, an MBA in sustainable business, and is a Chartered Environmental practitioner.

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Read Ben's Article

Connect with Ben (in

Ben Densham is Chief Technology Officer at Nettitude. He is responsible for leading the technical services and overseeing top-line security projects for this award-winning cyber risk management company. Ben has in-depth knowledge of compliance, risk and cyber strategy. A regular conference speaker, Ben leads and runs industry working groups for CREST as well as being a technical assessor.

Further information on Technical Matters roundup: Contact your local Lloyd's Register office

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