Class moving further into classification of combatants

Naval vessels have traditionally been constructed in accordance with navies' own standards and specifications, developed over the years to meet the specific requirements of warships. Whilst these standards and specifications have served fleets well, the requirement to meet today's expectations for safety assurance has led many navies to adopt recently introduced Naval Rules now provided by several of the leading classification societies.

As with any change in an organisation's processes, there is a need to understand the factors driving the process, why the path is appropriate and how the solution needs to be applied to maintain benefit. Much has been written on the background that has led to this change, but there is little deep understanding of how to gain its full potential.

As Lloyd's Register highlights, navies have, traditionally, been exempted from complying with statutory legislation in order that they can discharge their military imperatives without constraint. However, to apply the capabilities of equipment and platforms with confidence, levels of inherent safety need to be demonstrated through procurement and in service.

Current approaches range from certification against a set of prescribed standards (both internal to the navy and external from the commercial environment), to a fully risk based one where safety assessment (SA) techniques are applied. The major reservation with SA is that in defence projects the costs incurred seem to be out of step with commercial safety regulation.

Commercial organisations that have to meet regulation based on SA principles have integrated it into their whole business. The financial rigour that they apply to all aspects of their business has ensured the correct balance between the good governance that regulations demand with the cost of achieving it.

This careful consideration of cost effectiveness has led most commercial organisations to recognise that there are vast amounts of inherent knowledge embedded in standards and technical rules. This knowledge has been captured from assessments of previous failures and resulted in pragmatic solutions that have been extensively peer reviewed by industry and accepted as cost effective.

Industry has therefore recognised that many of the risks they face with each new venture can be effectively mitigated simply by applying existing technical standards. Those risks that are then truly novel to the venture can have a more detailed level of attention given to them to ensure that they are properly managed.

One area where SA is very weak, is in the number of assumptions it makes about supply chain management. Statutory Regulation requires that a level of independent third party (ITP) assurance is in place throughout the supply chain, from materials manufacture to system commissioning. This same process was previously undertaken by Naval Overseers and Factory Acceptance processes, but with the dismantling of this infrastructure no equivalent replacement has been implemented.

Commercially, ITP Product Verification remains a feature of the supply chain and classification societies play a significant role in this activity.

In its development of naval classification, Lloyd's Register says it has recognised this issue and worked extensively with a number of naval projects to integrate the deep knowledge of rules and standards into naval safety management.

This has included understanding and developing the need to be able to define exactly what hazards standards are mitigating, rather than trying to simply compare requirements. Without this common denominator of the two systems, apparently similar solutions can be misinterpreted and applied.

There are still hurdles and experience to be gained before this is routine business for all navies, but with a proper understanding of the naval requirements and the principles embedded in commercial regulation, Lloyd's Register says it believes class is well positioned to support any project irrespective of where it is in its life cycle. Sauro Gazzoli, Head of the Military Ship Department at Italian classification society RINA, told Warship Technology that RINA believes that class can best serve the warship sector by developing what he called an ad hoc approach and by assigning dedicated staff to develop practical solutions to the needs of the world's navies, and said he believed that RINA's ongoing work for the Italian Navy amply demonstrates the effectiveness of this strategy.

One example is the ad hoc rules developed by RINA - RINAMIL - for the classification of military ships (both combat and support class), and separate rules for fast patrol craft. They originate from the technology used in top end of the merchant ship sector (such as passenger ships and fast ro-ro vessels), suitably customised to meet military ship procedures and practices. The rules exclude weaponry and military communications, but cover all other structural and operational items, including fire protection, intact and damage stability, and environmental protection.

"The aim of RINA's rules for military vessels is threefold," Mr Gazzoli explained. "To facilitate the cost-effective application of merchant ship standards in military ship design and construction; to ensure that classification requirements do not clash with military vessel operational procedures and practices; and to provide the technical basis for the maintenance of military ships during their operational lives." RINAMIL was launched in January 2003. A revised edition was issued in January 2005, and a third edition is planned for January 2007. In addition, rules for the classification of patrol vessels, which have been in use since 2000, are expected to be issued in an updated form at the beginning of 2007. Another area where RINA's ad hoc rules have found an application in the military sector is in connection with MARPOL, the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes, which specifically does not apply to warships or naval auxiliary craft. However, the Italian Navy voluntarily elected to submit its entire fleet, numbering roughly 70 vessels, to an assessment of MARPOL compliance and certification - and entrusted the work to RINA. "The great advantage of MARPOL certification in the warship sector is that ships are verified to a standard which is recognised throughout the world, thus satisfying any doubts about environmental performance," said Mr Gazzoli.

"MARPOL cannot be applied automatically to military ships, however," Mr Gazzoli explained. "You have to allow for the differences between the two types of vessels. The officers and crew and shore personnel with responsibility for environmental matters have to be appropriately trained and familiarised with procedures, and
periodic certification of onboard procedures and maintenance is necessary to assess performance.

RINA's ad hoc approach for military ships provide for all this. RINA says it currently has about 300 ships in its military portfolio - covering both new buildings under construction as well as repairs and recommissioning of naval ships to police and other armed forces craft - for which it is providing technical support through maintenance programmes.

ongoing projects include classification of the Italian aircraft carrier Cavour, and of two Italian Navy Horizon-class frigates.

RINA has also developed customised, ad hoc rules, based on RINAMIL, for the Italian/French FREMM project to build a fleet of 27 frigates, the largest known European co-operative naval shipbuilding project, and is also involved in verifying the design of the Fincantieri propulsion system for an aircraft carrier for the Indian Navy.

Firm orders for the first eight Frigate European Multi-Mission (FREMM) surface combatants were placed by the French government with France's DCN during 2005, and orders for a further nine frigates are expected during 2006, all French examples of which will be built and maintained to BV class, further strengthening Bureau Veritas' links with international warship development.

The frigate contract follows the successful delivery of the force projection and command vessel BPC Mistral to the French Navy in January 2006. Built to BV class, the 200 m length overall amphibious ship was built in co-operation by DCN and Chantiers de l'Atlantique, and complies with all SOLAS and MARPOL regulations, and with BV's naval rules. Asister ship to Mistral, the 21,000 ton displacement BPC Tonnnerre, is due for delivery in the first quarter of 2006.

Building on the experience with these ships, BV will shortly publish an updated set of naval rules, which will include a full set of requirements for combat aircraft carriers. At the same time BV's consulting arm Tecnicas has already begun work on the preliminary design of the joint Anglo- French aircraft carrier project.

In the US, the Naval Sea Systems Command (NAVSEA) and the American Bureau of Shipping (ABS) collaborated on the development and implementation of a set of Naval Vessel Rules which are used in the construction, maintenance and modernisation of non-nuclear naval combatant ships. Although ABS has had a longstanding relationship with the US Navy, the signing of a formal Cooperative Agreement with NAVSEA in 2003, intensifies the focus for ABS to provide further technical support and guidance for the US Navy's shipbuilding programmes.

After many years of success in applying the ABS ship classification process on many Sealift and Naval Auxiliary programmes the US Navy and ABS decided to collaborate to address the lower risk aspects of designing and certifying non nuclear naval combatant ships. This allows in house US Navy engineers to be focused more on the higher risk mission-related aspects of combatants, while maintaining technical control via close collaboration with ABS on the Naval Vessel Rules. The US Navy retains technical authority, but uses ABS as a business partner to administer the Naval Vessel Rules, and as an agent in classing ships to BV class.

The next generation of combatants and support vessels built by the US Navy will, as a result, be constructed in accordance with technical guidelines from the classification society, ABS' 'Guide for Building and Classing Naval Vessels' having been formally authorized in 2004. "The rules are currently being used in the design and build of both the next generation destroyer DD (X) and the Littoral Combat Ship (LCS), a high-speed multi-mission platform ship," explained Glenn Ashe, Vice President of Government Operations, ABS Americas.

ABS is currently involved in classification or certification related activities on more than 30 US government vessel acquisition programmes, including the LCS, LHD-8, DD(X), and the XCraft 'Sea Fighter'.

"If it's new, non-nuclear and doesn't submerge, ABS will be involved to one degree or another," noted ABS, highlighting the fact that the US Navy's Programme Executive Office (PEO) Ships will elect to class any new design ship or craft it acquires, and that the naval vessel rules will develop on an ongoing basis.

As ABS noted last year, because the baselines for programmes such as LCS pre-existed the naval rules, areas of non-compliance exist which have been 'flagged' for adjudication. All of the naval rules developed by class continue to evolve, and for its part ABS identified several areas that need further work.

The support given by ABS to governments worldwide in the area of naval classification and certification activity continued to grow at a strong pace in 2005. Gleaning valuable lessons from initial application of the ABS Rules for Building and Classing Naval Vessels to combatants, the Naval Technical Committee authorized the first periodic update as embodied in the proposed ‘Rules Change Package’. This was an important milestone in that one of the greatest benefits the US Navy identified in embracing classification for its combatants was the healthy process for Rules review and update that is associated with it. ABS says classification work in 2005 continued on the first US Navy combatants to be classed, and ABS now has project teams applying the Rules for the second naval vessel project arising from the DD(X) to the LCS, the latter ships having begun construction with ABS Surveyors in attendance at Marinette Marine and Austal USA.

Last year also marked the commissioning and entry into active service of the Sea Fighter (FSF- 1), formerly known as the X-Craft. This high speed aluminum catamaran is currently in service with Commander Naval Surface Forces Pacific and is the first vessel to be designed, constructed and subsequently operated to the ABS High Speed Naval Craft Guide. It is being retained in class and is under attendance from the ABS San Diego office.

ABS has also been focusing on providing support for classing the various platforms that will support the US Navy's Sea Basing concept. These Maritime Prepositioning Force (Future) MPF (F) platforms will all be classed with ABS and include medium speed roll on/roll off vessels, advanced dry cargo delivery vessels, mobile landing platforms, air capable support ships and amphibious support ships. Design work also started on the ABS classed vessel that will provide interface support to the MFF (F) as well as intratheatre support to the Army - the Joint High Speed Vessel (JHSV).

Other activity included ABS certification work on the new pressurized rescue module and the launch and recovery system for the new submarine rescue diving and recompression system (SRDRS). This is being developed as the next generation rescue system for the crew of submarines in distress. ABS chaired the NATO working group that produced unified certification processes for all such submarine rescue systems worldwide to maximize interoperability among the navies of the world which operate submarines.

Navy from other nations are also seeking assistance from ABS - the Egyptian government's Fast Missile Craft (FMC) Programme and Fast Patrol Craft Programme call for series of high speed, highly manoeuvrable vessels to be built to ABS class and this work has been underway for some time. Such work is also being done for the government of Oman on a series of patrol craft it is building in the US, and the Mexican Navy is building patrol boats to ABS class. Added to this is similar classification work ABS is doing in support of both the Indian Navy and the Indian Coast Guard.

Support for the US Coast Guard's Deepwater programme continued in 2005 with ABS providing selected certification
BV is classing the French Navy’s Tonnere, sister vessel to the amphibious ship Mistral

for the first Maritime Security Cutter, Large (WMSL), otherwise known as the National Security Cutter.

This support included both engineering plan review and survey attendance. ABS began classification work for the Deepwater Fast Response Cutters and finalized similar certification support to be provided for the Deepwater Offshore Patrol Cutters. Work for the US Military Sealift Command (MSC) focused on keeping this fleet of logistic supply vessels operating in support of US forces in Iraq, Afghanistan and other regional assignments. Quick response engineering review and survey services were provided to keep the vessels in service.

Newly uncovered classification work for the MSC continued on the T-AKE, a ship that MSC will operate as an advanced dry cargo delivery vessel in support of deployed forces. The T-AGM(R) vessel project, a new construction missile range instrumentation ship used to monitor international compliance with strategic arms treaties began, calling for ABS classification. The US Army Tank Automotive and Armament Command (TACOM) engaged ABS to class the Logistics Support Vessels (LSV) being built at a US Gulf Coast yard. Hurricane Katrina moved two of these vessels over a mile and ABS survey services were used to certify the vessels condition after they had been refloated.

Through Boeing, ABS supported the Missile Defense Agency by providing classification review and survey of the new SBX platform, a Mobile Offshore Drilling Unit converted to carry a large X-Band Radar for application in the Strategic Defense Initiative missile defence programme. This vessel is now classed and in operation.

"This unprecedented level of involvement by ABS in an ever widening range of government and military programmes for the US and other nations is expected to continue and expand in 2006," noted ABS. Class has moved quite rapidly into classification of warships, but to-date, only Germanischer Lloyd has developed rules specifically for submarines, and in October at the KORMARINE exhibition in Pusan, Korea, GL presented its classification services for military submarines for the first time.

"Thanks to the classification of submarines, their structural safety will already be assured at the plan approval stage. Through the subsequent construction supervision, together with the certification of components and parts, the risk of the shipyard is minimized," said GL. "At the same time, the naval customer receives a vessel offering enhanced safety and quality standards at reduced cost."

Published recently, the new rules for submarines are based on the wide-ranging experience of GL gained in providing technical advice and support for 25 navies around the world over the last 30 years, to naval customers in countries such as Korea, Israel, Norway and Argentina. GL says the submarine rules were decisively influenced by the knowledge obtained from technical support for civilian submarines - in fact, GL first published construction guidelines for submarines in the 1970s.

The construction rules for military submarines - entitled 'Preliminary Rules for Sub-Surface Ships' - form part of the 'Rules for Classification and Construction, Naval Ship Technology,' and are subdivided into three chapters:

- Submarines, with pressure hull, structural strength, dynamic behaviour, propulsion, electrical equipment.
- Remotely Operated Underwater Vehicles (ROVs) with their launching and recovery systems, manipulators, manoeuvring equipment as well as tests and trials.
- Guidelines for Air Independent Power Systems for Underwater Use (AIP systems), including materials, fuel systems, energy converter, and explosion protection.

All four common AIP processes (Fuel Cells, MESMA, CCD and STIRLING) are addressed in detail in the construction rules from GL. For the classification of new build submarines, GL’s rules cover plan approval, materials testing and inspections, construction supervision, trials and certification of fuel cells and of AIP systems. GL says independent data leads it to believe that as many as 300 new submarines will be ordered worldwide over the next 20 years, and that of these around 180 submarines will conventional, diesel-electric boats. As Vaughn Pomeroy, who is director of LR’s naval business, explained recently, the essential work for class, in terms of developing naval ‘products’ and publishing them in the form of rules and regulations for the classification of naval ships, along with supporting guidance on surveys and application, has been completed, although the classification societies will continue with their ongoing review and updating to reflect experience and application. Looking further into the future, LR and the other major class societies believe that class rules have a major role to play in the transformation of the naval procurement process, whether for new ships or for the upkeep of existing ships, which, they note, requires measures to help manage the risks associated with change.

"The classification process has a number of key attributes which act as effective risk mitigation of many of the technical and safety risks a project will face, particularly when the relationships between the various parties involved are changing. Providing a thorough process for establishing the standards for the platform is undertaken at an early stage a cost effective compliance verification regime can be put in place that will deliver benefits in terms of risk management throughout the ship life cycle," noted Mr Pomeroy in a recent paper given at a RINA conference, noting that the classification process applied to naval ships has now been thoroughly tested by application to concept and design stages, new construction and operational ships.

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