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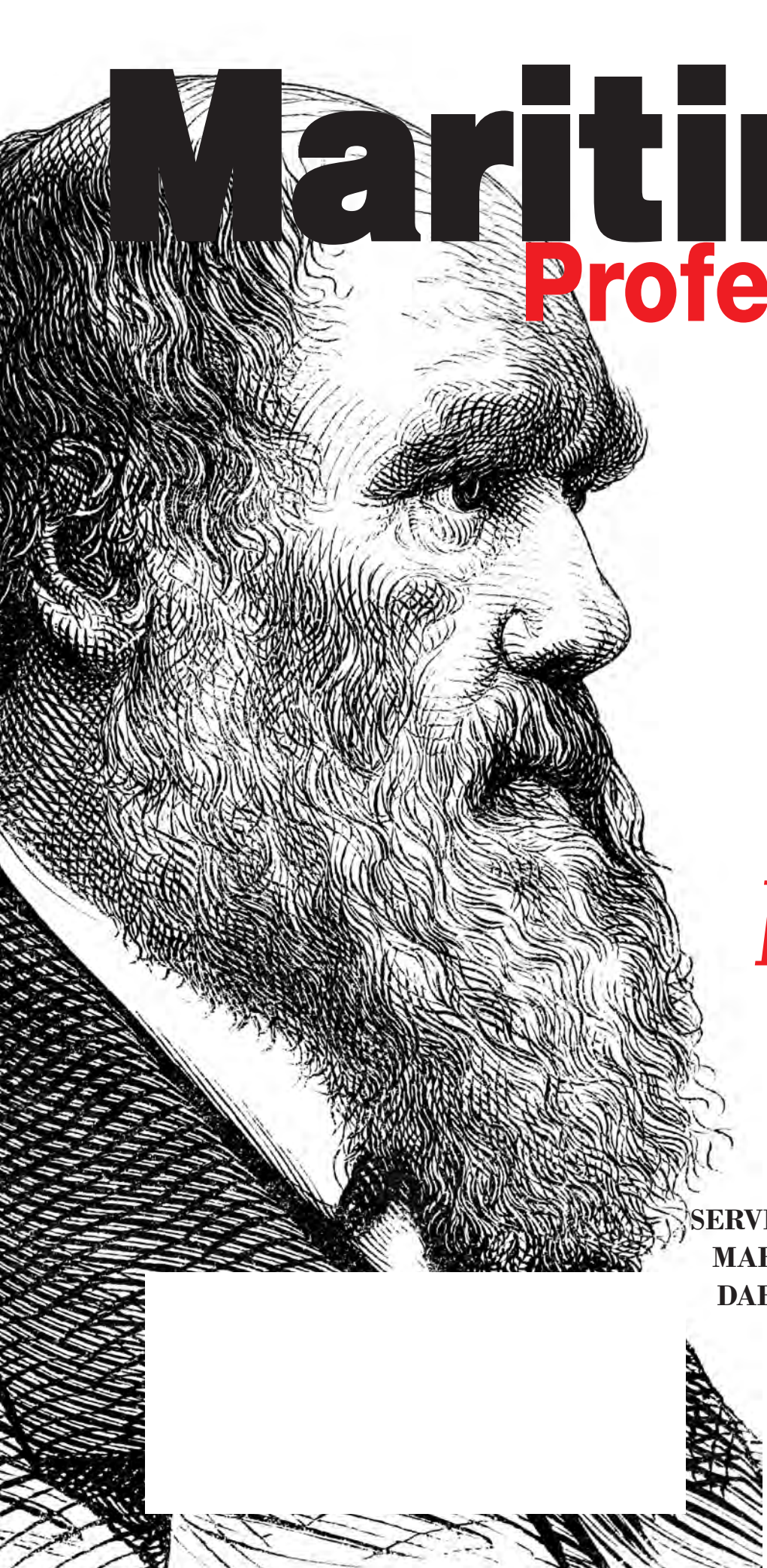

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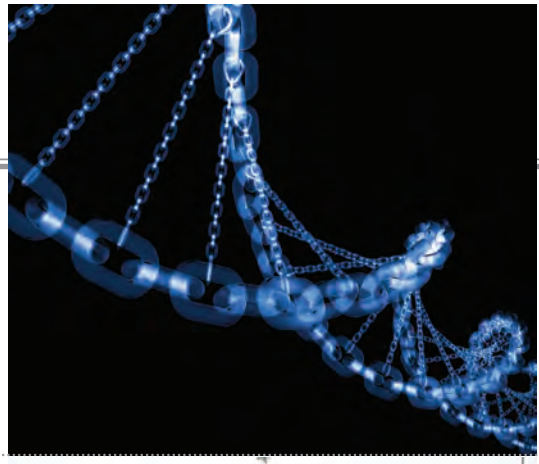

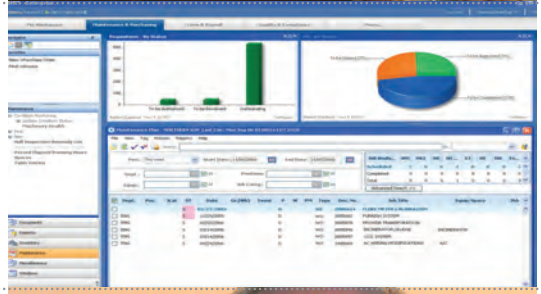

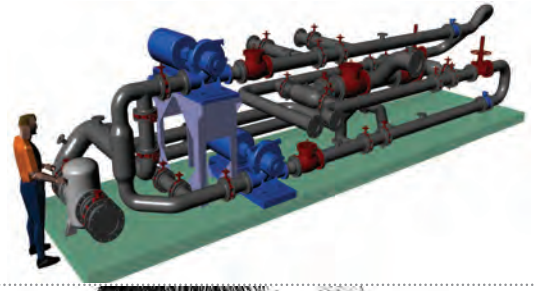

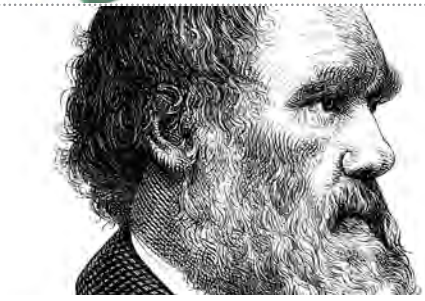

ON THE COVER

Charles Darwin probably had ocean commerce in mind when he thought up the concept of "survival of the fittest." Even he probably couldn't envision what today's modern classification societies have evolved to become. More than rules and enforcement; class now embodies vision, innovation and ultimately, the way forward for today's waterborne fleets.

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Meet the *Contributors*

Joseph Fonseca, is a maritime and logistics journalist who also contributes to **MaritimeProfessional.com**. His knowledge is in the areas of Freight Forwarding and Shipping & Supply Chain Management. He is based in India.
Story p. 22

Robert Kunkel, President of Alternative Marine Technologies, is currently serving as the technical advisor to Alterna Capital Partners during the construction of the MV American Phoenix at BAE Shipyards in Mobile, Alabama.
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Story p. 59

Rear Admiral James Watson is responsible for Seaport Security Assessments, Boating Safety, Commercial Vessel Safety and Security, Ports and Cargo Safety and Security, Maritime Investigations, and Quality Traveling Inspectors.
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Also in this Edition

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Change: Moving to the Head of the Class

Does it seem to you that things used to be a lot easier? Previously, tracking the path of the typical hull from concept to contract, KM to keel, day of launch to delivery and the regulatory life of a vessel that followed could arguably be described as a fairly linear path. Not so much anymore. It used to be all about defining the "class" rules and then making sure that everyone was on the same page and that the world's collective merchant fleet continuously evolved into a safer, more environmentally friendly enterprise. Today, all of that – and more – just isn't enough in this fast paced and highly complex environment. Where gaps developed, however, the world's best classification societies have stepped up to fill the void.

The role of the modern ship classification society in 2011 and beyond is not easily defined and in some cases, bears only the vaguest resemblance of what came before. That's because the needs of the global shipping industry have also changed; in part due to the severe regulatory hammer on the seven seas and inland waterways, but also as a function of advanced technology. Together, these two variables combined to create some of the toughest challenges ever seen on the waterfront. Along with that comes opportunity.

This issue of *Maritime Professional* centers closely on how classification societies are evolving to meet today's challenges, each in their own unique way. That said, and since building, maintaining and operating a marine vessel in this day and age also involves so much more, these pages would be incomplete without also reaching out to the naval architects, technology providers, shipyards, flag state registries and the regulatory arm(s) that collectively form the basis of today's environmentally correct, energy efficient and regulatory compliant hull.

For many years, progress on the waterfront was chiefly measured in terms of increased deadweight capacity, length over all, or the addition of another 1,000 TEU's to those towering mega-containerships. As this edition came together, it became more than obvious that amazing technology – some of which had long been employed ashore – had made its way into the hull and the offices of the modern ship. Ocean shipping and waterborne commerce will therefore never be the same.

What is the "classification society of the future?" *MarPro* associate publisher Greg Trauthwein takes the temperature of key players and sheds new light into a traditional role that is quickly taking on a futuristic look. Also within these pages, our in-depth look at one of the world's largest open registries might just alter your perception of what a modern "flag of convenience" – or as we now define it – "flag of compliance" can be. For our North American readers, a look at Jones Act in terms of shipbuilding, legal and regulatory issues rounds out our coverage nicely. As a sum of the whole, you might just be surprised at where we take you.

It did used to be a lot easier and a whole lot less complex. That doesn't mean we can't get the job done. Stem to stern; this issue of *MarPro* explains how and why.

Joseph Keefe, Managing Editor | **keefe@marinelink.com**

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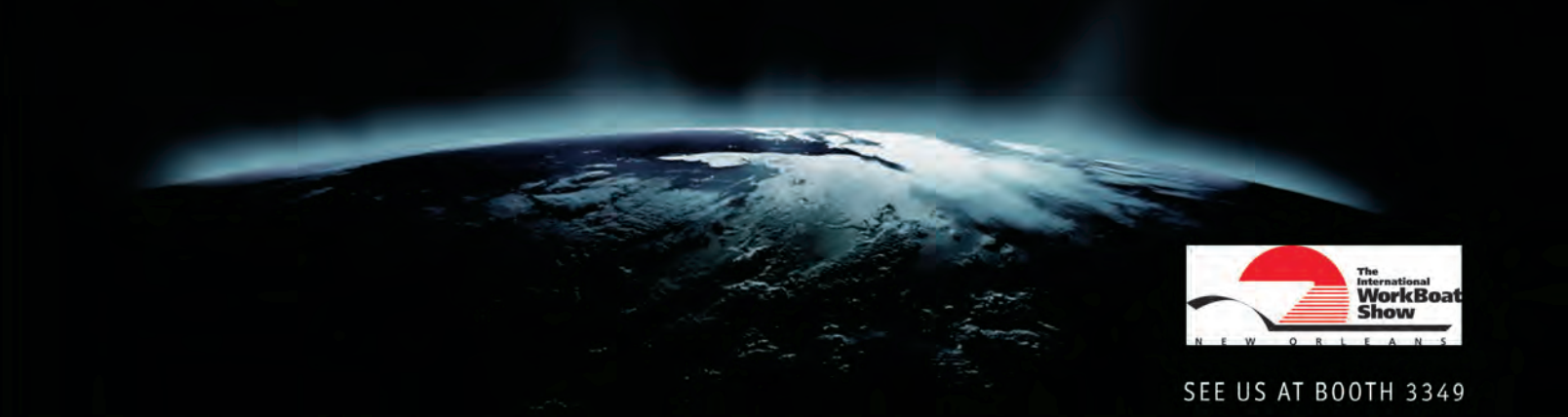

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Insights

U.S. Coast Guard Report
Proactive, Practical Prevention

By RADM James A. Watson

The U.S. Coast Guard's RADM James A. Watson, Director Prevention Policy, weighs in for MarPro on the state of one the Coast Guard's most important and enduring missions.

More than Numbers

On an average day, the United States Coast Guard responds to 64 'maydays', investigates 12 marine accidents, and mitigates 10 pollution incidents. These numbers of life, property and maritime environmental incidents are reason enough to have a prevention strategy and trained professionals dedicated to preventing accidents from happening in the first place. But, the potential for a really bad day in the maritime realm is even a more compelling reason to have a good prevention program. America relies on maritime transportation, global trade, the recreation industry, and resources from the sea like never before. Certain maritime catastrophes, if they occurred, could result in bare shelves in our supermarkets, long lines at the gas pump, changed trade and recreation patterns, and thousands of lost jobs.

High standards for design, construction, maintenance and operation of commercial vessels are critical to the overall Coast Guard prevention program, which also includes safety, security and stewardship policies for ports, waterways, and recreational boating. At last count, there were 11,860 USCG certificated commercial vessels. Last year, we recorded 42,545 inspection activities and issued 27,780 work items related to this tonnage. Very few of these activities and work items resulted in a detention or penalty of any kind. The Coast Guard has broad authority over these vessels and crews to prevent accidents and takes particular care to ensure a balance between ensuring safety and facilitating commerce.

There are two other major groups of commercial vessels: uninspected U.S. flag vessels and foreign flag vessels. Uninspected commercial vessels can include very small workboats, vessels carrying six or less passengers, inland barges, towing vessels, and fishing vessels. On this front, there is significant news for uninspected vessels involves towing and fishing vessels. The Coast Guard and Marine Transportation Act of 2004 mandated that towing vessels be added to the list of inspected vessels, and the Coast Guard Authorization Act of 2010 mandated examinations for fishing vessels operating beyond 3 miles.

There are 6,328 U.S. documented towing vessels and 20,039 documented fishing vessels. Another 52,847 fishing vessels are state registered. For fishing vessels, however, where they fish and how big they are will be significant. Fishing vessels over 79 feet, for example, will now need a load line.

Proposed Rulemaking, New Standards Coming

A notice of proposed rulemaking for towing vessels was published on August 11, 2011. The proposed standards would include electrical, machinery, and firefighting criteria, and would allow owners to use third party auditors and surveyors as an alternative to a Coast Guard inspection. Public meetings to receive comments on the proposed rules are ongoing in the ports of Newport News, St. Louis, New Orleans, and Seattle. Anticipating this new workload, an additional 96 Coast Guard billets were recently added where towing vessels are operating. That said, over half of the documented towing vessels have been examined already as part of a bridging program to achieve certificated status smoothly. As many as 2,700 vessels already possess valid uninspected towing vessel decals to help the transition process and assure the highest level of safety.

On another, similar front, the Coast Guard is working closely with the Commercial Fishing Vessel Advisory Committee to develop the examination and compliance standards to sat-

isfy the 2010 legislation for fishing vessels. These regulations will likely take a year to develop and will include lifesaving and stability standards along with training and competency requirements.

There are currently 79 full time Coast Guard civilian and military commercial vessel examiners and 100 part time Auxiliary examiners. In 2010, they completed 8,729 exams and issued 4,525 safety decals. To date this year, 7,496 have been examined and 3,766 decals issued. Also ramping up to meet anticipated demand, a target number of examiners is being developed, assuming 17,500 exams per year will be necessary once the rules are finalized.

Foreign Vessels

In 2010, a total of 9,260 foreign vessels from 90 different flag administrations made 76,372 port calls to the United States. The Coast Guard conducted 9,907 SOLAS safety exams and 8,906 ISPS exams on these vessels. Significantly, the number of ships detained for environmental and safety related deficiencies decreased from 161 to 156 in 2010 and the number of ships detained for security deficiencies decreased from 18 to 17. The Coast Guard keeps statistics on flag administration performance. Over the last 12 years, detention rates have decreased from 4.73% to 1.67%. We have a targeting policy to board vessels more if the flag administration has a poor record and, at the same time, less if the flag administration has earned status in the QUALSHIP 21 program, which requires submission of the IMO's Voluntary Member State Audit summary.

Safety: A Partnership with Industry

The Coast Guard works very closely with Classification Societies, which are recognized organizations for many flag administrations, including the United States. The following

are Recognized Organizations (per 46 CFR 8):

- ***American Bureau of Shipping***
- ***Det Norske Veritas***
- ***Lloyd's Register***
- ***Germanischer Lloyd***
- ***Bureau Veritas***
- ***RINA S.p.A***
- ***Nippon Kaiji Kyokai***

Beyond this, ABS, DNV, LR and GL are also authorized to conduct Coast Guard inspections on U.S. vessels enrolled in the Alternate Compliance Program (ACP). Currently 285 vessels are in enrolled in ACP.

Prevention: Real Progress, Qualified Inspectors

The Coast Guard has increased its civilian inspector and investigator corps to 206. Seven National Centers of Expertise (NCOE) were created and filled with journeyman and advanced journeyman level (GS-12 and GS 13) civilian positions.

The qualifications advertised and rating tools used for NCOE positions are much more specific and difficult to satisfy than those used to staff civilian journeyman inspectors and investigators at field units. Candidates from industry were highly desired for NCOEs. Recruitment bonuses and step increases were very important in filling these positions.

Civilian Apprentice Marine Inspectors (CAMI) are graduates of maritime academies and have merchant marine licenses. They begin their careers in marine safety at the GS-7 level at a feeder port.

As they gain experience and competencies, they progress from apprentices to journeymen at the GS 12 level. As they earn journeymen status, they will move to available GS-12 inspection or investigation positions nationwide, and are eligible to compete for more senior positions. In the last two years, 23 CAMI positions have been filled from as many as 250 applications, of which 170 were certified to complete for the 23 positions.

I am happy to report that the overall Coast Guard commercial vessel safety program is doing well and the industry seems to be responding positively.

The Author

Rear Admiral James Watson reassumed the duties of Director of Prevention Policy for Marine Safety, Security and Stewardship, Coast Guard Headquarters, Washington DC on 1 July 2011. He is responsible for Seaport Security Assessments, Boating Safety, Commercial Vessel Safety and Security, Ports and Cargo Safety and Security, Maritime Investigations, and Quality Traveling Inspectors.


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Insights

Built in the United States of America

By Dennis L. Bryant

With limited exceptions not relevant to this discussion, federal law provides that a coastwise endorsement may only be issued to a vessel that has been built in the United States.[1] Because of the extensive coastline of the United States, as well as its thousands of miles of navigable rivers, lakes, etc., having the exclusive right to transport merchandise by water between ports and places in the United States is a highly valued condition and vessels with a coastwise endorsement command a premium on the open market. At the same time, construction of a vessel in a US shipyard is considerably more expensive than construction elsewhere. Concomitantly, due to the low level of new commercial shipbuilding in US yards, parties make considerable effort to maximize the actual amount of work performed in the United States.

The US Coast Guard, to which administration of the vessel documentation laws has been assigned,[2] provides by regulation that to be considered built in the United States a vessel must meet both of the following criteria:

(a) All major components of the vessel's hull and superstructure are fabricated in the United States; and

(b) The vessel is assembled entirely in the United States.[3]

The Coast Guard has long held that there is no limit on the amount of foreign materials, such as steel, that may be used in the construction of the hull or superstructure provided that the material, prior to importation into the United States, has not been worked in any way and has been imported in standard shapes and sizes as produced at the foreign mill.[4]

The Coast Guard has further taken the position that foreign components amounting to less than 1.5% of the vessel's steelweight are not considered "major" for purposes of the US build determination. In this regard, the Coast Guard is solely concerned with the steel or other material that forms part of the flotation envelope of the hull or the structural components of the superstructure.[5] Thus, the weight of the engine, tackle, and other free-standing, self-supporting, and independent items is not included in this particular calculation.

The same is not true with regard to structural reinforcements of the deck or hull in way of a foreign component to be added to the vessel. The structural reinforcement, such as a load-bearing foundation, must be fabricated in the United States, in the same manner as major components of the hull or superstructure.[6]

A vessel being fabricated in the United States and for which a foreign-manufactured component is intended to serve as an integral part, must have that component installed in the United States in order for the vessel to be considered US-built for purposes of eligibility for the coastwise trade. This allowance of a large and/or heavy foreign component (such as an engine) is true even where the base and foundation for the component are required to be fabricated in the United States.[7]

The most significant challenge to the Coast Guard's administration of the "built in the United States" provision started in 2007, when several maritime trade unions brought suit against Admiral Thad Allen, Commandant, US Coast Guard, after the USCG National Vessel Documentation Center (NVDC) issued a ruling stating that tankers under construction at the Aker Philadelphia Shipyard would be eligible for operation in the US coastwise trade even though they would include "certain foreign-built engine room-related macro modules" so long as the entire assembly of the vessels would be done in the United States.[8]

The maritime unions contended that, since extensive prefabrication and preassembly of the macro modules would be performed in South Korea, vessels containing those macro modules would not be "built in the United States" as required by law and that the Coast Guard's interpretation and application of the law was arbitrary and capricious.[9] On the other hand, the Coast Guard contended that "assembly" as used in the regulation applied only to the vessel, not to the various parts that went into the construction of the vessel.

The court examined the Coast Guard regulation interpreting and administering the statute. It found the regulation to be ambiguous because neither the unions' interpretation nor the Coast Guard's interpretation was the only reasonable interpretation. Because the interpretation of the agency charged with administration of a statute is entitled to judicial deference, the court then examined the Coast Guard's particular interpretation (the ruling under challenge) to determine whether it was either plainly erroneous or inconsistent with the regulation. The court found that the Coast Guard's interpretation was not unreasonable. It also found that the Coast Guard had consistently applied the regulation in the same manner as it was applying it in the instant case. Further, agencies that had interpreted and applied the statute prior to the responsibility being assigned to the Coast Guard had also applied it in like manner. Finally, the court noted that Congress had conducted numerous hearings over the years regarding the cabotage issue and had amended the cabotage provisions several times, but had not overruled the interpreta-

tion of "built in the United States" as applied by the Coast Guard or its predecessor agencies.

Ultimately, the court granted the Coast Guard's motion for summary judgment, holding that deference to the agency's interpretation is appropriate because such action reflects an awareness of the practical expertise which an agency normally develops. The Coast Guard interpretation was found to allow American shipyards to continue building vessels without imposing limitations on the source of parts so excessive as to render the American construction of ships too expensive to pursue.

In its determination, the Coast Guard considered the various purposes of the "built in the United States" law. The Coast Guard's approach furthered the overall purposes of the statute and the unions presented no good reason to disturb the agency's judgment about how best to weigh the individual purposes to effectuate Congress' overall goals. As the court stated: "Where Congress has entrusted the agency to make these judgment calls, it is not for the courts to upset the rational balance the agency has struck." Judicial review is limited to deciding whether the agency's decision reasonably advances at least one of the statute's objectives and whether its decision-making process was regular.[10]

The Coast Guard position on "built in the United States" has not been seriously challenged since the 2008 litigation. The application of that policy to particular fact situations remains at issue, but uncertainties are being gradually eliminated as rulings continue to be made.

The Author

Dennis Bryant is the Principal at Bryant's Maritime Consulting and editor of the daily Enewsletter "Bryant's Maritime Blog."

Footnotes:

1 46 U.S.C. § 12112(a)(2)(A). The exceptions include vessels captured in war by citizens of the United States and lawfully condemned as prize; vessels adjudged to be forfeited for a breach of the laws of the United States; and vessels qualified as wrecked vessels.

2 Upon the founding of the federal government in 1789, vessel documentation was handled by the local Customs Commissioners. In 1884, the function was transferred to the new Bureau of Navigation, which later became the Bureau of Navigation and Steamboat Inspection, and eventually the Bureau of Marine Inspection and Navigation. The Bureau was abolished and its vessel documentation functions were transferred back to the Customs Service in 1946. In 1967, in conjunction with the transfer of the US Coast Guard to the new Department of Transportation, the vessel documentation functions were transferred to the Coast Guard.

3 46 CFR § 67.97.

4 See, USCG National Vessel Documentation Center (NVDC) letter 16713/5/2 of August 1, 2011 regarding NASSCO barge.

5 Ibid.

6 Ibid.

7 USCG NVDC letter 16713/5/3 of 14 April 2011 regarding offshore support vessel. See also, USCG NVDC letter 16713/5-2 of September 15, 2009 regarding cutter suction dredges.

8 The maritime unions had requested that the NVDC find the vessels to not be eligible for the coastwise trade soon after Aker Philadelphia Shipyard had applied to the Coast Guard for a ruling. Application for a new vessel determination is provided for at 46 CFR § 67.175. Although there is no specific regulation addressing application for a US build determination, the practice is not uncommon.

9 The court described a macro module as consisting of equipment and other supporting systems and outfitting, about two decks high. Outfitting of the module would include machinery components and foundations, equipment, piping, switchboards, cabling, lighting, stairs, ladders, railings, and floor grating. Each module would be installed in the vessel in the US shipyard.

10 Philadelphia Metal Trades Council v. Allen, No. 07-145 (E.D. Penn., August 21, 2008). See also, the court order of June 22, 2007, denying a motion by the International Brotherhood of Boilermakers and other unions to intervene as plaintiffs in this action. The court found that the interests of these other unions were adequately represented by the original plaintiffs.

Insights

Rising from the Ashes of Virtual Shipbuilding

By Robert Kunkel, President, Alternative Marine Technologies

The concept of a "virtual shipyard" has been discussed for decades. Take a network of specialized manufacturers, integrate them into a cost-effective total ship construction system and channel that expertise into a timely delivery schedule. The "virtual" architecture was initially developed for military newbuilding with hopes the effort could eventually support commercial ship construction in the United States. Unfortunately the first true commercial attempt at the virtual theory failed in 2009 as word of shutdown and bankruptcy drifted out of the smoke that was the American Heavy Lift coastal tanker project in Mobile, Alabama.

There are many unanswered questions of why the original project failed. Many of which had to do with the "virtual" concept of the construction. Planning is critical in the shipbuilding process and the multitude of players involved in a "virtual" tanker construction added to the problems that planning process deals with. A strategic construction schedule must integrate the many functions that are critical foundations to the building and changes to that strategy eventually contribute to the final cost of the ship. The construction goal may be a long series built under the same design within a single shipyard and a schedule that eventually finds its efficient state and a reasonable cost. However, only the Far East has the opportunity to contract and successfully build those long series for an international market.

Shipbuilding Challenges: Unique to the U.S. Market?

U.S. shipbuilding, on the other hand, continues to look for answers in its quest to become competitive: What is the best construction sequence for a ship? How can a shipyard best utilize its resources during the construction process? How can the negative impacts of design changes and delays be minimized? These are only a few of the questions U.S. builders continually face. Despite the fact that many remain unan-

M/V American Phoenix preparing for launch on October 18, 2011.

Photo Courtesy Robert Kunkel

swered, concept designs are produced and the ship production process begins before the actual completion of the design. The answer to why the AHL project failed may be as simple as that mistake – to build before the complete production design is available and fully Class approved.

That fact aside, this is the land of opportunity and the AHL Hull 103 sitting on the blocks at BAE Shipyard in Mobile, Alabama can be compared to a unique bird that lived for five or six centuries ago in the Arabian desert. As the legend goes, once burning itself on a funeral pyre and rising from the ashes with renewed youth, the resurrection of the MV American Phoenix has commenced with new Owners and a new shipyard – all of which look to be heading for a bright future.

American Phoenix: It lives

Purchased out of a Louisiana bankruptcy court auction in January of 2011 for approximately $12.6 million dollars by Mid Ocean Tanker Company (MOTC), a partnership of Alterna Capital Partners of Wilton Connecticut and Mid-Ocean Marine of Norwalk, Connecticut, Hull 103 is nearing completion, launched on October 18, 2011 and a delivery date projected for April of 2012.

Make no mistake about it: the American Phoenix is not your father's Jones Act product carrier. The design features take into account environmental protection with a Class ES (Environmental Safety) notation and system redundancies usually seen only in the Alaskan trades. Yet her trading markets were originally planned for the U.S. Gulf. Interestingly – and perhaps significantly – the ship's design was developed prior to the Deepwater Horizon accident and was geared for the unique trading demands of the domestic Jones Act product and chemical trades.

Robust, Modern – and Built to Last

Classed by the American Bureau of Shipping with an R2+ Propulsion Redundancy, the structural design goes beyond that machinery notation. This IMO II Chemical/Product Carrier is the first American built tanker to be constructed under the latest IACS Common Structural Rules with a twenty-five year fatigue life. The internal structure is within the tanks spaces, unlike recent MR deliveries carrying that structure on the main deck. A CPP (Cargo Piping Protected) notation has also been added

Purchased out of a Louisiana bankruptcy court auction in January of 2011 for approximately $12.6 million dollars by Mid Ocean Tanker Company (MOTC), a partnership of Alterna Capital Partners of Wilton Connecticut and Mid-Ocean Marine of Norwalk, Connecticut, Hull 103 is nearing completion with a launching date of October 18, 2011 and a delivery date projected for April of 2012.

as the fiberglass reinforced ballast piping and stainless cargo piping is located above the double bottom and/or run through a protected pipe tunnel. To say she is "built like a tank" would not be overstating the case. The bottom shell plate and main deck have scantlings nearly 4mm thicker than recent tanker deliveries and hull bending moments for hog and sag follow suit showing increased strength.

All that steel is protected by an International Paint coating system of Intershield 300V IMO PSPC compliant epoxy in the ballast spaces and Interline 994 high performance Phenolic epoxy in the cargo tanks. The choice of International Paint Phenolic 994 was made to provide the vessel with the maximum spectrum of cargo carriage available. U.S. Coatings of Satsuma, Alabama was selected by the owner's technical team to apply the coating systems at BAE Shipyard. The PSPC standard, coating materials and strictly monitored application has allowed the vessel to capture the ABS Class notation of CPS or "Coating Performance Standard" and extended warranties from International Paint.

Propulsion is provided by three 5,600 KW MAK 12VM32C diesel engines with Siemens IDK4543 generators. The diesel-electric power driving two 4,500 KW VEM motors with twins shafts supported by Kobelco stern and strut bearings that are water lubricated and cooled. The propulsion system is fully redundant with only two generators required in operation to achieve a 14.5 knot operating speed – the third generator remains in standby. According to model tests completed at MarineTek, one generator in operation will produce an economical speed of 11 knots. Propulsion integration, automation and navigation controls have been provided by L3 Westwood of Metairie, Louisiana. Despite the idle time that has occurred since the 2009 stop work order, major equipment and machinery recently inspected by manufacturer's representatives and L3 as part of the remediation process has produced reports of "as new" conditions. Testing and trials are projected to occur in early 2012.

With principal dimensions of 187.78 meters in length, 32.2 meters breadth and a molded depth of 18.3 meters, the American Phoenix is positioned to load significantly more cargo on both design and scantling drafts as compared to similar tonnage currently in the domestic trade. Projected lifts are estimated at 39,600 MT on 34'6" (10.5m), 42,400 MT on 36'0" (11.0m) and 48,900 MT on 40'0" (12.2m) with 12 cargo tanks and 2 slop tanks. The vessel's cargo piping is stainless steel with a Framo system providing 3,600 m3/hour of pumping power.

Technology + Competency = Success

As impressive as the ship's equipment list may seem (and it is), the success of this project remains in the hands of the software. The completion of the vessel design, its final construction, testing, and trials demanded a large collection of independent maritime construction consultants as the new owner's requested that no stone be left unturned. To compare the project to a George Clooney movie, this would be the maritime industry's "Ocean 14" and the decades of tanker and ship construction experience of the project team easily totaled over 400 years. Adding in the new BAE management to the existing Mobile, Alabama shipyard facility and some qualified subcontractors and the ship has been placed in good hands.

Vic Rhoades, Director and General Manager of BAE Systems Southeast Shipyards, said of the project, "The successful resurrection of this new construction project is and has been a top priority for BAE Systems. This project's success is critical not only for the future of our new construction business, but especially for the hundreds of dedicated shipyard employees who started work on Hull 103 years ago. Now they can be especially proud of their great efforts to finish the construction of the MV American Phoenix. BAE

Systems continues to work closely with MOTC and all of the project's vendors and sub-contractors, and we are confident that as a team, we will deliver an exceptional vessel ready for Jones Act service."

Picking up leftover pieces in a failed ship construction project is no picnic and the resurrection required new drawing reviews, strict re-inspection, scores of non destructive testing procedures, along with several layers of technical oversight to dispel the dark cloud of unsubstantiated rumors that hung over Hull 103 during her idle period. Most, if not all of those rumors were found to be urban legend.

Naval Architects at Resolve Marine of New Orleans, Louisiana were contracted for continued drawing and design review. Sea Technology of Darien, Connecticut was utilized to develop project management, Time Marine and Mammoet of Louisiana to lift and deliver the last modules of the "virtual" build into Mobile.

MOTC believes the redundancy concept and efficiency the diesel electric design brings to the domestic tanker fleet will appeal to the decision makers of major oil companies. Nickel van Reesema spoke to the environmental benefits form a commercial point of view: "No major oil company wants to see their name attached to an environmental accident in the media. The latest accidents in the U.S. Gulf are proof of that. MOTC believes the industry focus should be on safety, redundancy and environmental protection and we intend to deliver those options at a competitive price. That promise alone should allow the decision makers to sleep at night."

Looking forward, sea trials are scheduled for early 2012 and the addition of the MV American Phoenix to the American Flag Fleet, soon thereafter. Updates on the project and information on Mid Ocean Tanker Company are available at **http://www.midoceanmarine.com**

The Author

Robert Kunkel, President of Alternative Marine Technologies, is currently serving as the technical advisor to Alterna Capital Partners during the construction of the MV American Phoenix at BAE Shipyards in Mobile, Alabama. He is a past Vice President of the Connecticut Maritime Association, a contributing writer for Maritime Professional Magazine and the Technical Manager for Coastal Connect (www.coastal-connect.com) a U.S. company actively developing LNG propulsion as a maritime component of short sea shipping and offshore wind energy along the coasts of United States.

MarPro Profile

Karen Hughey, President and COO
ABS Nautical Systems

In mid-September, ABS Nautical Systems brought together more than 100 of its customers in Houston for its User Conference, an annual rite which it uses to update its customers on new developments in the NS5 fleet management product suite. Just as importantly, the ABS Nautical Systems' technical and management team is on hand to receive real-world feedback, an indispensible tool in refining and improving its software solution and customer service. On the sidelines, Karen Hughey, President and COO of ABS Nautical Systems, shared with Maritime Professional her team's mission to use the NS5 Enterprise suite of software solutions to help bring about the "Class of the Future."

— By Greg Trauthwein, Editorial Director

The business of maritime companies incorporating software solutions is still years behind many industries, but given the inherent logistical hurdles a typical maritime operation presents – an aging workforce and recruiting challenges; a growing litigious and regulatory environment; as well as dramatically increased sophistication of machinery and electronic systems onboard – great strides toward acceptance are being made. As maritime operators increasingly accept and incorporate software solutions as a viable means to enhance efficiency, safety and profitability, a number of new "solutions" emerge, and the result is a veritable alphabet soup of everything from stand-alone products to complex systems, all vying for the shipowner and manager's attention, technical buy-in and budget.

Enter ABS Nautical Systems, a company with the backing and resources of one of the world's leading and long-tenured classifications societies, a company with the technical breadth from both the maritime and IT world's to design, develop and continually enhance its leading "soup to nuts" electronic platform for the modern marine industry: NS5 Enterprise.

"What we all understand is that it is even more than efficiencies that people need software for; it is compliance, it is transparency," said Karen Hughey, President & COO, ABS NS. "You can no longer run your business without having that, and expect to compete or comply."

Software is increasingly becoming an indispensible tool on the modern bridge, a multi-faceted and tightly interwoven system that has become a critical part of running the vessels, from maintaining the condition of the vessels, the equipment, the machinery, and even the structure itself, Hughey said.

ABS Nautical Systems' signature product is NS5 Enterprise, a system designed to be as comprehensive as it is flexible, a system which has evolved over 25 years to meet the ever evolving needs of maritime operators. The fully integrated information network handles the primary functions of operational management, from maintenance to supply chain to workforce to safety.

NS5 Enterprise is essentially a critical information access and management tool, allowing managers from the deck to

the C-Suite the ability to more efficiently monitor and manage the growing mounds of data.

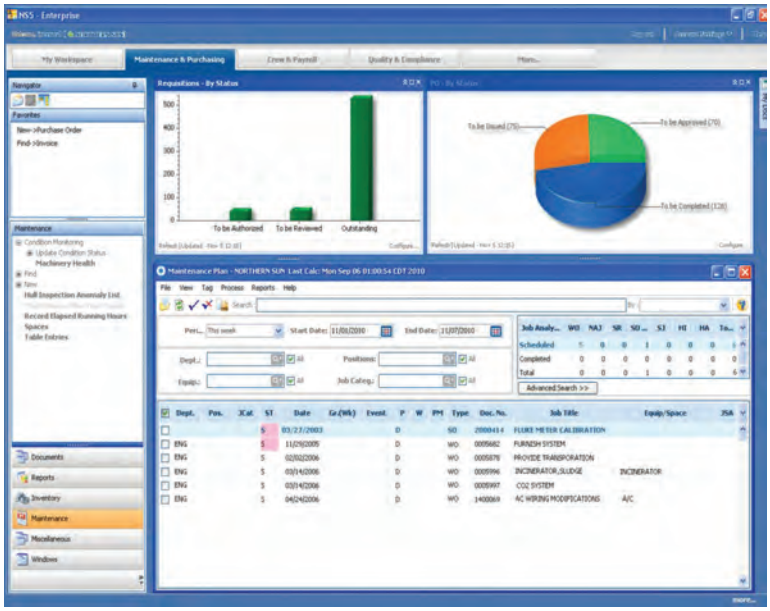
Breaking Down Barriers

A key challenge for any software provider in the maritime space is simply gaining acceptance from the ship and boat owners that a software solution is indeed a more efficient and effective way to run their fleets; their business. The marine industry, particularly in the mid- and small-company sectors, tend to rely on accrued knowledge and experience of its long-tenured captain and crew. But, taking one example, with new medical regulations working to effectively thin the ranks of experienced boat operators more quickly than ever before, most every maritime operator faces the challenge of an aging workforce and a dwindling number of young talent in the pipeline. Modern, proven software solutions can go a long way in making the job of owning and operating vessels more efficient, safe and cost-effective.

"People in this industry are traditionally conservative when it comes to accepting new technology and sharing their operational information," Hughey said. "That's not meant as a negative, it is just how it is. What we're trying to do with our software solutions is lay a foundation that will enable customers to attain operational, safety and technical excellence across their organizations, as well as improve the process of survey planning and preparation for ABS-classed vessels, with a company they know and trust."

"For example, if they (the owner/operator) already have an inspection/integrity management program in place, they are already capturing the information." Essentially the ABS NS system, if fully employed is designed to capture and manage that information in a more intuitive and efficient manner.

While Hughey agrees that the maritime industry presents a longer selling



Karen Hughey

President and COO, ABS Nautical Systems

"What we all understand is that it is even more than efficiencies that people need software for; it is compliance, it is transparency. you can no longer run your business without having that, and expect to compete or comply."

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www.abs-ns.com

cycle, she was quick to point out that you can't paint the picture with one broad stroke, and that there are companies around the world where software solutions are more readily adopted.

Once a company decides to adopt all or part of the NS5 Enterprise solution, Hughey said the tables turn to one of the company's key differentiators: customer service and support. "Some companies know they need to move to a software solution, and they are trying to be proactive about it. But they need a lot of support, as many companies do not have the skills or resources internally to pull off one of these implementations."

"It is important to note that each customer has a dedicated account manager whose number one focus is to make sure they are successful in running NS5. If a client ever needs assistance, not only do they have a general number to call, but an account manager who is always there for them. In fact, sometimes it is the account manager that realizes the customer is struggling, and they can reach directly into our product development group and into our consultancy services to help solve the problems"

The ABS Nautical Systems User Conference

Every year ABS Nautical Systems holds a user

conference, and the rite has shown the power of bringing key customers together under one roof to examine past operational issues and learn of new challenges, specifically how the system can evolve to meet the challenges.

"The value of the user conference is the value of the networking," said Hughey. "Users share their stories, specifically the way in which they use our products. Every year we are putting new capability into the software, and a lot of that demand – I would say 100% – comes from our customers. If you are not keeping up every year with what that company (your customers) is doing from the product standpoint, then you're not getting all of the value you can get out of the system."

According to Hughey, a key differentiator of ABS NS' suite of solutions lies in the fact that it is a virtual one-stop-shop, and that "these products have not been put together through acquisitions; they have been built to be integrated," she said. "Whenever we create a new module, we look to see how it connects to all of the other modules. Our customers have found that to keep things moving, it is easier to make one call than to call 20 separate vendors."

It is key to note that an operator need not class its vessels with ABS to enjoy the benefits of NS5 Enterprise. "What we say is our software adds value to all of our customers; to ABS customers, it adds exceptional value," Hughey said.

For full details on NS5 Enterprise, Email: NS-info@eagle.org

Interview

Indian Register of Shipping

On a Higher Trajectory

Captain J. C. Anand takes IRS to the next level.

by Joseph Fonseca, Mumbai

One cannot mention Captain J. C. Anand (pictured right) without also referencing the Indian Register of Shipping (IRS) in the same breath. That's because, as he gets set to call it a day as IRS Chairman, Anand's dream of setting up India's own Classification Society became a reality under his leadership. Soon after becoming the President of the Indian National Shipowners' Association (INSA), he embarked on this mission closest to his heart. Thus the first item on his agenda was to give India its own class.

To start a classification society, Anand first had to win over the shipowners. This he did by joining INSA and establishing the Pent Ocean group. He soon had a fleet of five ships. His resourcefulness and acumen got him elected as INSA's treasurer and he soon rose to become the President. As one of his first efforts there, he approached the Indian Government and placed before them his case of starting a classification society. Although at that time primarily the domain of more established seafaring countries, and despite the fact that most in the ministry felt it impractical, they eventually gave him their blessing, without committing financial or any other kind of support.

Setting up the society initially entailed hiring the right people to do the job. Anand started by establishing the promoters' committee of ship owners and then took on five seasoned surveyors - from another foreign society - who were willing to join and take the risk to support his new venture. The initial strategy was to go in for dual class, which although initially difficult, eventually paid off for Anand. Support first came from one IACS member, then another and eventually one more. The dream of establishing IRS was halfway home.

THE IRS JOURNEY

"We had no money to begin our venture," says Anand. He adds, "As President of INSA, I approached INSA members and was able to arrange about USD $145,000 USD to get IRS started. Two years later when the industry faced a downturn we repaid back the entire sum. Thereafter, there was no looking back. Today, IRS has no shareholders and pays no dividend. All the profits are plowed back into the organization. We have no loans, no borrowings. All our achievements are due to the technicians who diligently work with us and are considered second to none in the world."

Founded in 1975, IRS developed its first set of Rules in 1977, but despite Anand's immediate goal of achieving entry into the prestigious International Association of Classification Societies (IA CS), IRS had to wait 15 years to qualify for Associate status. With the first overseas office set up in 1998 (Sri Lanka), IRS steadily increased its overseas footprint. Today, with established offices in ten cities across the globe, IRS provides worldwide service. Their Greece and London offices look after entire Europe; Houston covers the Americas; Dubai office takes care of UAE, the entire East is covered by IRS offices in Sri Lanka, Korea, Singapore, Bangkok and China. Beyond this, IRS also has arrangements with other foreign societies to act on reciprocal basis in the event of any emergencies or casualties.

IRS leadership believes in sharing knowledge with others and collaborates with other societies in several research projects. The Society has representation on the four technical panels of International Association of Classification Societies (IACS) and is part of the Indian delegation to the Maritime Safety Committee & Marine Environment Pollution Committee of the International Maritime Organization (IMO). The Society's representatives regularly attend meetings of the IACS panels & IMO Committees.

IRS achieved full membership in IACS June 22nd 2010. At that time, the IACS Chairman remarked, "The membership of IRS in IACS is a good sign for our organization and for our

IRCLASS
Indian Register of Shipping

clients. It is a reflection of the quality philosophy and high quality standards imposed by the Indian Register of Shipping." Notably, IRS is one of the founding members of the Association of Asian Classification Societies (ACS), an Association officially started last year and intended to complement the activities of IACS. One of ACS' major activities involves the undertaking need-based research for regulatory bodies and other shipping bodies in Asia.

AFTER IACS: THE WORK CONTINUES

Arun Sharma, the new IRS Chairman, said in September, "IRS has the honor of being funded by the European Union (EU) for participating in one of their research projects. In fact IRS is the only member to be funded by the EU for this EU research project. IRS was also the first associate member of the IACS to be recognized by the International Underwriters Association (IUA) under the Institute's Classification clause. Under this clause only full members of IACS were granted recognition and IRS became the only member to be recognized in May, 2000, while still an Associate of IACS, under this clause."

IRS has focused much of its attention on research and development, along the way developing several technical software tools for in-house use as well as for industry. This includes "Shipmate", which guides the master and ship's personnel regarding the condition of the ship in real time, and how to manage the safety of the ship in case of grounding and other emergencies. Among other things, it also provides advice on how to mitigate damage caused in an accident. Another major IRS effort involves computer based training modules, which are eLearning modules for conducting surveys and carrying them out efficiently.

Significantly, IRS sets aside almost 30 percent of its revenue for R&D and has on-going training programs to ensure consistency in work and execution of the surveys. Training is also provided the Indian Administration, Coast Guard, Navy, shipowners, mariners and a host of other stakeholders.

Since achieving IACS compliance, IRS leaders have not been sitting on their hands. India and Singapore became the first two countries to meet all target dates for the implementation of the ISPS code as declared by the then IMO Secretary General, for which purpose the Indian Administration appointed IRS as the sole 'Recognized Security Organization' (RSO) to ensure ISPS Code compliance by Indian Ships & Ports.

On other fronts, IRS has focused on getting authorization from foreign flags to carry out statutory surveys on their behalf. In this way, IRS recently received approval from the UAE and Liberian authorities to do so after being duly audited by their organization. "We are also waiting to hear from the authorities of Marshall Islands," adds Anand. "Simultaneously, we have also approached other maritime countries in order to expand our services to flags of other administrations."

IRS: NOT JUST CLASSIFICATION; REAL EXPERTISE

IRS also has two other divisions; specifically a Management System certification group and one which involves Industrial services. The latter specializes in providing third party inspection and project management services in sectors including oil and gas, infrastructure, power, Petrochemicals and general engineering. Nevertheless, fully 65 percent of the IRS revenue stream comes from the marine side. The company has served the Indian maritime industry in several ways seeking to provide self-reliance in matters of ship classification and developed rules for different types of ships. It has also developed rules jointly with the Indian Navy and Coast Guard. On the port side, IRS has framed rules for material handling, ISPS compliance for both the major and non-major ports and has made Indian ports achieve self reliance in this regard.

Anand steps aside at a special time for the Indian maritime sector. Having been instrumental in moving the country to self-reliance in the realm of ship classification and other maritime affairs, Anand on 1 September passed the baton to Arun Sharma, a Chief Engineer with extensive experience not only at sea on a variety of platforms, but also as someone who is firmly committed to the missions of IRS. Sharma inherits an organization that has been through much, overcome many hurdles and now, has established itself as a legitimate player in the world's group of elite classification societies. That's IRS in a nutshell: a fully recognized IACS classification society on a trajectory destined for still higher orbit.

The Author

Joseph Fonseca is a maritime and logistics journalist who also contributes to Maritimeprofessional.com. His knowledge in the areas of Freight Forwarding and Shipping & Supply Chain Management allow him to write for many international and national periodicals. He is based in India.

SCI Mumbai, an India Register of Shipping classified vessel.

R
Registry

International Registries Inc.

Redefining the Modern Ship Registry

by Joseph Keefe

International Registries, Inc. (IRI) raises the bar on safety and compliance, shedding new light on what the modern, open ship registry can and should entail. It's more than you think.

The International Chamber of Shipping (ICS) recently warned the maritime industry that a balance had to be struck between the commercial advantages of selecting a particular flag state and the need to discourage the use of flags that do not meet international obligations. Emphasizing that point, Simon Bennett, ICS Director of External Relations, said "Shipping is one of the safest and most environmentally friendly modes of transport, yet several high profile casualties have prompted questions from politicians and the media about the performance of flag states. There is understandable concern about shipping companies' use of flags that may not comply fully with international regulations." In the same breath, Bennett concedes that "open registers such as the Bahamas, Liberia and the Marshal Islands enjoy the same very high standards of performance and responsibility as flags such as Denmark or UK."

For some, the phrases "flag of convenience" or "foreign registries" conjure up visions of the seedy post office box where, for a cheap fee and the name of a ship, the fly-by-night ship operator with questionable maintenance and crewing practices can obtain a rubber-stamped safety certificate and a legal footing to remain on the water. The misconception that an open ship registry somehow promises poor, unsafe tonnage, facilitating owners who hide behind obscure mailing addresses still persists. Nevertheless, a look into the inner workings of some of today's most prominent open registries – where one can build a ship anywhere, crew it with any nationality and finance it wherever he so chooses – can tell a much different story. One such place is International Registries, Inc., the Corporate Administrators of the Republic of the Marshall Islands (RMI).

HISTORY OF FLAG (IRI / MARSHALL ISLANDS)

International Registries, Inc. (IRI) and its affiliates provide administrative and technical support to the Republic of the Marshall Islands maritime and corporate registries. Administering maritime and corporate programs for over 60 years, IRI traces its origins to 1948 and Edward R. Stettinius, Jr., the United States (US) Secretary of State during the latter part of World War II. The concept of a US-administered open registry had its earliest beginnings when President Franklin D. Roosevelt visited Liberia in January 1943, shortly after the Roosevelt-Churchill conference at Casablanca. Stettinius saw the need for a future peacetime open registry system administered by a private company. Eventually, IRI's predecessor corporation, Liberian Services, Inc., was formed in New York on February 4, 1949.

The formative years of what became IRI saw the Liberian Registry grow to 79 million gross tons in the 1970s. IRI was formed in 1990 as the parent corporation for its various affiliates, and entered into an agreement with the Republic of the Marshall Islands to develop a new maritime and corporate program. IRI expanded rapidly and now administers one of the largest maritime registries in the world. In 1993, IRI became privately held, owned and operated by its senior employees. As a result of the continued political instability of the Liberian government, IRI parted ways with the Liberian Registry on January 1, 2000 and has since then solely administered the Marshall Islands Maritime and Corporate Registries. Now the third largest open registry in the world, the Marshall Islands registry is made up of the full range of ocean-going tonnage. The Registry's network of worldwide offices has the ability to register a vessel, record a mortgage, form a corporation and service clientele. In a business where size can and does matter, however, it is not size that defines what IRI and the Marshall Islands ship registry have come to stand for.

IRI AND THE MARSHALL ISLANDS – STANDING APART

Bill Gallagher, President, International Registries, Inc. (IRI), acknowledges the explosive growth of the Republic of the Marshall Islands (RMI) flag but also explains, "We actually turn away more tonnage than we accept." He goes on to say that with size and volume also comes the danger of spreading a flag state's resources too thin. Not so at IRI, though. That's because the price of admission to obtain registration in the Marshall Islands also includes an exhaustive vetting process, performed primarily by in-house, salaried technical personnel, many of whom boast years of experience at major classification societies.

Gallagher reports that while a large percentage of RMI newly registered tonnage is of newbuild origin, second hand tonnage gets an usually close look before considering an owner or vessel for acceptance. "We look at older tonnage firsthand, getting numerous photos through physical attendance. The vetting process now involves more looking at machinery and less paper chase. Inspection durations have

increased from 4 hours to 8 hours. And, this amounts to an audit of class." Gallagher adds, "We accept their (class) recommendations but we also oversee their methods."

Boasting a Maritime Services Group that is ISO 9001:2008 certified, IRI procedures also depend on a global standard. ISO-certified since 1995, and only recently renewed again, all of IRI's smaller international offices are also part of the quality system, and regulated by controlled documents, etc.

PIRACY AND CASUALTIES – TESTING THE FABRIC OF ANY REGISTRY

Today's international marine transportation industry demand administrations that provide a compliant regulatory atmosphere regarding maritime safety, security and environmental protection and one that is capable and willing to act responsively and decisively whenever or wherever necessary. Achieving those metrics entails 24-hour global coverage, conducted by qualified professionals. In the case of IRI, this involves their Hong Kong office covering overnight traffic and then – following the sun – that traffic migrates to the Piraeus office, on to Reston and soon, on to a new Los Angeles U.S. west Coast office. In this way IRI and RMI achieve total global technical oversight at all times. Eventually, a Brazil office will be opened so as to properly serve that rapidly burgeoning market and its many players.

It is possible that IRI is not the only flag state administrator that tracks every single one of their 2,485 vessels with an LRIT Tracking and Status Board, but they were the first. Utilizing IRI's 24/7 global office spread, the movement of vessels is constantly monitored and those headed into dangerous or pirate infested watered are warned (automatic "trip" lines) and then put on an accelerated reporting schedule. Any vessel that fails to report in or shows an unexpected anomaly in its expected track is queried and investigated.

THE RMI FLEET – IMPRESSIVE STATISTICS; DEEPER THAN THE RAW NUMBERS

Bill Gallagher dislikes the old labels. "We are a flag of compliance; not a flag of convenience." Looking at his fleet statistics, it is difficult to argue with him. This is not your grandfather's flag of convenience. Indeed, Table 1. depicts a spread of quality tonnage that any shipper could envy:

The statistics are important for many reasons. In terms of the publicly traded companies, no one wants to see their "good citizen" corporation's name in lights when the oil is pouring unabated from the ruptured hull. Participation in a quality flag state registration scheme is one way to lessen

"You can't nickel and dime it over at IMO. You have to have active representation on committees dealing with such critical issues as STCW. We don't expect kudos for doing it, but we do participate and it costs money to do so. A lot of flag states don't participate."

Bill Gallagher, President, IRI

THE MARSHALL ISLANDS REGISTRY

INTERNATIONAL REGISTRIES 1948

The misconception that an open ship registry somehow promises poor, unsafe tonnage, facilitating owners who hide behind obscure mailing addresses still persists. Nevertheless, a look into the inner workings of some of today's most prominent open registries – where one can build a ship anywhere, crew it with any nationality and finance it wherever he so chooses – can tell a much different story.

Table 1

Who and what is the RMI Fleet?

- **Fleet Average age:**
  Less than 10 years (more newbuild tonnage than reflags).
- **Third largest open ship register in the world**
  Almost 2500 vessels & 74 million gross tons.
- **Strong in energy**
  Tankers account for almost 700 ships. Tankers averaging 7 years.
- **Publicly Traded Companies**
  Now make up the majority of RMI fleet.
- **Most IPO's**
  In last five years have been Marshall Islands companies.
- **Makeup of fleet ownership**
  Led by Greeks, followed by U.S. companies/nationals.
- **Class Breakdown**
  ABS (26%) • DNV (22%) • LR (19%)
  RMI only registers IACS tonnage.

the chances of that happening. At IRI, that type of thinking goes hand-in-hand with their role in the International Maritime Organization's (IMO) voluntary flag state audit scheme. Bill Gallagher adds, "Eventually, we see this as something that will become mandatory and so got in on the front end to impact the evolution of it in a positive way. That is why we signed up."

On the other hand, IRI and the RMI don't need another safety scheme to prove that theirs is one of the safest flags on the water today. Take their membership in the U.S. Coast Guard's Qualship program, for example. Qualifying for the program entails maintaining a three year rolling average of detentions equating to less than one percent of the fleet. The distinction is important because it removes a flag state from the Coast Guard's targeted inspection list.

The Qualship achievement is harder than it sounds; the larger your ship flag, the harder it is to keep this under one percent. Bill Gallagher adds, "Qualship early on was all small, European flags. We've been on Qualship 7 consecutive years, and 9 of the last 11." In doing that, IRI manages to do something that very few others can claim: controlling quality from the position of volume, across the full breadth of the fleet. Beyond this, the Marshall Islands flag regularly maintains its position on the Paris MOU (port state control) white list, something reserved for the lowest risk vessels.

Not content to sit back and be content with the status quo, IRI has always been out in front on a number of safety and regulatory fronts. Similar to their position in July of 2004, when RMI was the only flag state – including the United States – that was 100 percent compliant when the International Ship and Port Facility Security (ISPS) Code

came into force, IRI is once again leading the way with the soon-to-be-enforced Maritime Labor Convention. Gallagher says, "We have several vessels that are certified and hundreds more that have initiated the process under our voluntary certification and inspection program for MLC, 2006 and it is not even in effect yet. As such, we're probably out in front of everyone on that score." Finally, the Marshall Islands Quality Council has prompted arguably the most stringent validation scheme for crew licensing and documentation anywhere.

AFTER THE REGISTRATION – PLENTY OF WORK TO BE DONE

Running the third largest ship registry on the planet involves quite a bit more than shuffling paper. "We meet with and interact with class every day," says Gallagher, adding, "Working with class, you take the theoretical and make it practical. And, you remain in the process via various committees." Beyond this, IRI annually gives a comprehensive presentation to the U.S. Coast Guard marine safety group. "We take a very proactive stance with port state control. When port state control knows that a flag state is competent and confident, they'll hand over problems to us to solve – and we gladly to do so."

Also meeting with the International Association of Classification Societies (IACS) twice annually, IRI fosters an approach to fleet quality and management that extends to active roles at the IMO (ILO) conferences, Manila for STCW and a dozen places in between. Gallagher explains, "You can't nickel and dime it over at IMO. You have to have active representation on committees dealing with such critical issues as STCW. We don't expect kudos for doing it, but we do participate and it costs money to do so. A lot of flag states don't participate."

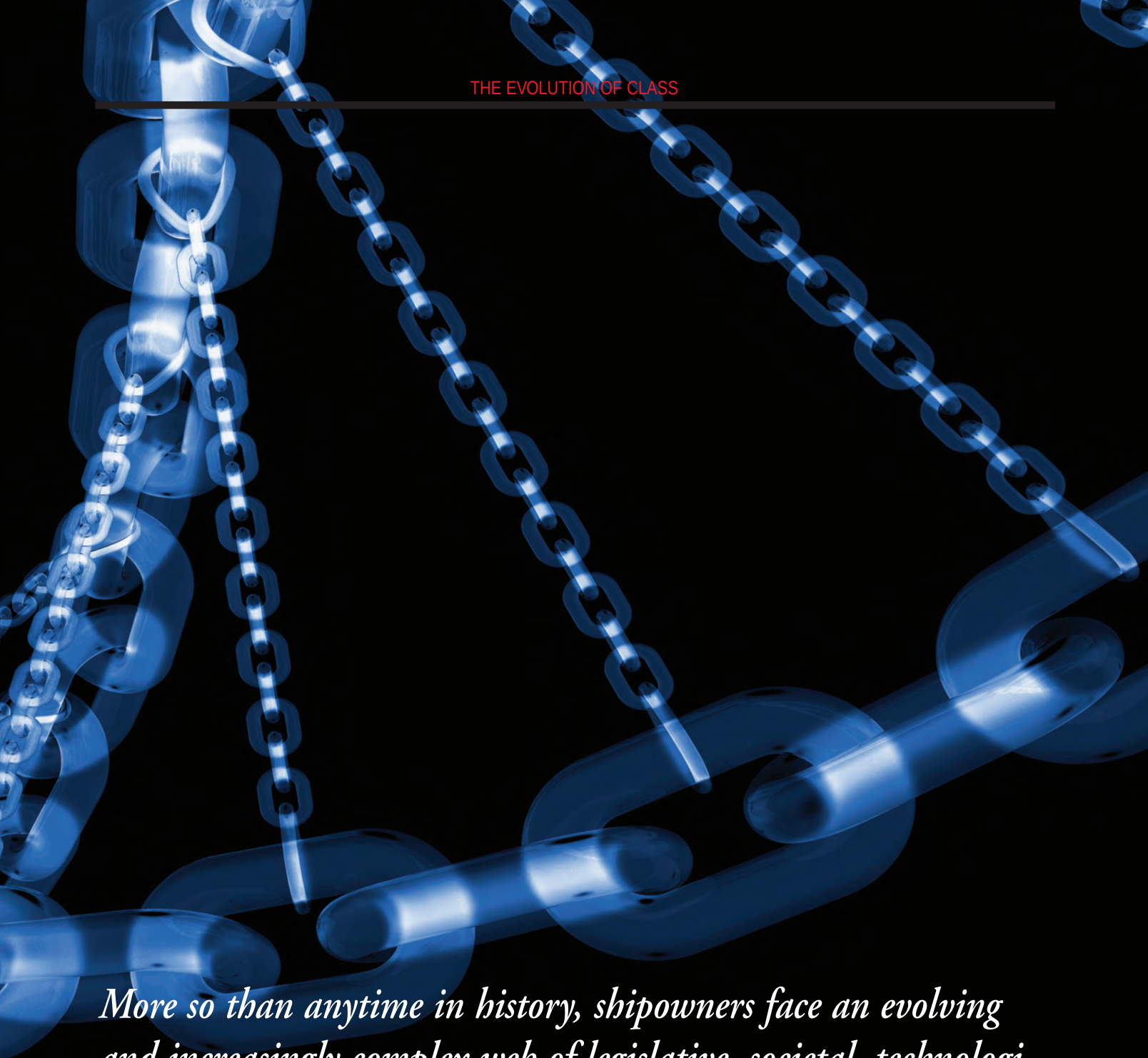
The properly run ship registry is convenient for more than the obvious reasons. To say there is more to doing the job right than meets the eye would not be overstating the case, especially where it comes to Reston, VA-based IRI. At one time, 90 percent of work and registration work was done in Reston; IRI now actually has more employees overseas. Truly a modern, global outfit, as much as 40 percent of seafarer licensing and ID creation are now done overseas. Backing all that up is a sophisticated computer network and redundant offsite IT services located off-site. Efforts to increase data security continue even today.

Bill Gallagher sums up the IRI philosophy nicely when he says, "We found out that in the early days of the Liberian Registry, we started growing fast but our compliance side wasn't quite up to snuff. That's why we hired retired-Coast Guard RADM Robert North to come in and take a look at our marine safety and vetting. We knew that we could not grow the business without growing the infrastructure. And that's why we are constantly adding offices and adding people. The best part of our decentralization plan is that we are able to draw upon talent, worldwide. E-mail is nice, but there is nothing like having a competent, local presence to bolster your quality and safety. You have to be face-to-face with the clients and the ships themselves."

When ICS Chairman Bennett said that shipping companies that have primary responsibility for the safe operation of their ships and the welfare of their crews, but it is the flag state that must enforce the rules, he probably had IRI and its RMI flag state in mind. And, as Bill Gallagher's 20th anniversary with IRI came and went last month, no other flag state arguably does that better.

Those who know Gallagher and IRI also know that they'll collectively settle for nothing less.

Evolution of Class



More so than anytime in history, shipowners face an evolving and increasingly complex web of legislative, societal, technological and business pressures. Classification societies are increasingly being employed to help them navigate these perils, as class has evolved from its traditional roles of inspection and certification to that of consultant and a bona fide business partner.

— By Greg Trauthwein, Editorial Director

Make no mistake, today's classification society is no longer your father's classification society. In fact, it's not even your older sibling's classification society. The maritime industry is in the midst of an era that in the future will be deemed as a watershed. The cavalcade of legislation, environmental regulation and technical demand from international, national and regional authorities has stretched companies – large and small – perilously thin in their drive to keep pace with new rules and regulations. Add to this an aging workforce and the looming loss of decades of experience, and a dearth of talent in the maritime pipeline, and the outlook is bleak. Or is it?

Enter the modern classification society, once solely the authority for survey and certification, which has evolved in parallel with the industry. While maintaining its traditional "class" technical inspection roles, the modern classification society today is positioned as a business partner – a consultancy – for the ship owner and operator. Today's class is an innovator, developing advanced new concept designs to help solve current and future problems. Today's class is a trainer, a repository of the physical tools and professional talent to keep modern mariners at the ready and new mariners on career course. Today's class is a technology integrator, able to help companies meld innovative new software solutions, for example, to make the operation of ships and boats more safe, efficient and cost-effective. To discover how these changes are affecting the industry, *Maritime Professional* recently visited with executives from five leading classification societies – ABS, DNV, GL, LR & ClassNK – for their insights.

Christopher J. Wiernicki, American Bureau of Shipping (ABS)

"Through our investments in our Nautical Systems division, we are developing fleet management software products that help our clients use their class data in a manner that will allow them to not only minimize service interruptions but to operate more efficiently and safely and, to some degree, in a closer partnership with their class society."

DRIVERS FOR CHANGE

Before discussing how class has changed, it is first important to understand why it has changed. First and foremost, the global maritime industry is in the midst of a historic transformation in the way in which it is regulated, particularly in regards to environmental rules and regulations.

"At the end of the 1990s, with all of the major accidents, it really emphasized that the role of classification has never been as important," said **Kenneth Vareide, Director of Operations, North America Maritime, Det Norske Veritas** (DNV). "It has sparked a need for more transparency in this industry. The role of class has never been more important (or relevant) and as technology and innovation continue to evolve, class need to step up to the plate and deliver and at the same time keeping focus on safety and environment. Class of the future is going to be much more proactive."

While each organization has its own specialty and areas of expertise, each address common themes. These include keeping abreast of emerging legislation and regulation at all levels, while assessing and helping to foster the technologies and good business practices that will be required to comply. Making matters even more interesting, rule-makers increasingly legislate ahead of technical development, leaving owner/operators in the Catch-22 of facing legal and financial sanctions for standards that may be impossible to meet.

"It is a different world today than even five, let alone 10 years ago," said **Christopher J. Wiernicki, President and CEO, American Bureau of Shipping** (ABS). "The demand for information and the speed of communications have radically changed everyone's expectations. It wasn't that long ago that we would mail details of a vessel's survey status to the owner once a year. Today that information is available from our website. The immediacy of information changes the entire dynamic. Our clients, their flag states, port states all want information and increasingly they turn to class to provide them with an ever-widening range of information particularly with respect to regulatory changes. The host of regulatory changes – from the IMO, from the EU, from individual US State governments and others, the growing importance of energy efficiency which can require real time monitoring of shipboard equipment from ashore, and the constant challenges of the market all play a role in this shift."

New rules, starting with SOLAS, up to the ISM Code and the soon-to-be adopted Maritime Labor code were cited as major turning points by all interviewed. In part these rules

Tim Protheroe, Lloyd's Register North America Inc. (LR)

"As we have just come to the other side of our 250th anniversary, it is interesting to reflect and look back at what has changed in the industry in that period. Obviously, the changes are dramatic; in just the past 15 years there has been an exponential growth in technology and regulation. Another key social/political issue is the environment."

spurred class to move past traditional, hardware-focused roles and into new "software" responsibilities regarding on-board management systems.

"Today the industry has a much broader spectrum, as it's not just the hardware anymore, but also the software, and we have new regulations related to the ISM and ILO coming down the pipe," said **Tim Protheroe, President, Regional Marine Manager, Lloyd's Register North America, Inc.** (LR). "Owners are looking to partner with class to assist them in meeting their business objectives. We are no longer just the surveyor onboard issuing a certificate, maintaining class and maintaining statutory. It now goes far beyond that, and class' move from technical inspection into consultancy has been a major feature in the changing role of class. Consultancy covers a very broad spectrum of activity, and it is driven by an expectation from our owners in how they want to work with classification. We see now the need to be engaged with many different areas – the environment, sustainability and human factors – to name a few."

Uniquely, Wiernicki sited the global adoption of Common Structural Rules for tankers and bulk carriers – the dominate portion of the world fleet by percentage – as a driver for a changing class. He explains: "The rules mean that class no longer finds itself competing for contracts on the basis of

Kenneth Vareide, Det Norske Veritas (DNV)

"You can never regulate or design away from the human element. You will always have the human element, and you must simultaneously train, educate and strengthen the human side of the equation."

their individual technical standards but on the level of service they provide to the shipyard during the plan review stage and surveys during construction. That emphasis on service is carried forward on the delivery of the ship to the owner. As a consequence, where previously the activities of the major classification societies were largely similar, there are now some significant differences not only in the products we offer, but also in how we approach the business including the emphasis that we each place on providing those products on the back of differentiated, superior service."

While there is strong merit regarding the changing role of class in the current generation, the largest classification societies by tonnage, ClassNK, maintains that the trend is in fact decades old. "When classification began as an industry in the 1760's, class societies primary concern was the registration and evaluation of ships, but with the introduction of SOLAS, MARPOL and the other major international conventions of the 1900's, classification grew to become regulators of the industry as well," said **Noboru Ueda, Chairman & President, Class NK (NK)**. "With the MLC, as well as new requirements for ECDIS aboard ships and other new regulations, we are really just seeing a continuation of this trend."

CHANGING ROLE OF CLASS

"The conversations with our clients have changed, such that they are looking for depth of knowledge and expertise in a much broader spectrum of activity with regard to subjects like the environment, the continuous onslaught of regulatory requirements and the challenges faced with some of the growth in regulatory issues, particularly from the European Union," is how LR's Protheroe succinctly summarized. But while LR has surely evolved with the times, it maintains its core focus. "Our chief executive, Richard Sadler, makes it very clear that our core business in the marine industry is classification and, from a core perspective, you need that foundation to maintain the level of confidence to operate assets in the way that industry is operated today. I think the industry sees classification societies in different ways. But, principally, it is a repository of knowledge, expertise and experience."

As the conversations and requirements have broadened, so too has class itself, with the trend toward acquisition of complementary companies and brands that have enabled class become closer to a one-stop-shop for the shipowner. A notable development in the past decade has been the emergence of innovative concept designs from all of the major class societies.

"Classification societies do not design, build, operate and maintain vessels," said **Uwe Bullwinkel, Head of Region Americas, Germanischer Lloyd**. "However, the aim of classification societies is the promotion of maritime safety for the common good. In this respect, our philosophy has been broadened in recent years in order to reflect changes in the perception of class by our clients. We often hear that our knowledge about the technical operation of a vessel is unique. Therefore, we are asked to provide more consultancy services when ship owners are in the process of ordering new vessels. With our knowledge about the technical requirements of new forthcoming legislation to curb emissions of all kind, it seems to be an obligation to assist our clients in their decision making process."

Bullwinkel added that GL has evolved – through internal growth and acquisition – in recent years to include a more robust R&D capability. "That means we don't offer any ship designs but design concepts, consultancy and software tools developed to help shipyards or design firms to improve their fuel efficiency and designing process. The latest idea is the concept of a Zero Emission Feeder Vessel which is a practicable example how to use surplus energy from offshore wind parks and at the same time to operate a vessel in a very competitive environment at commercial feasible prices."

Another area where class has taken the lead is in the assessment and management of risk across the commercial maritime spectrum, a topic which lies particularly close to the heart of all matters maritime and offshore at Det Norske Veritas (DNV).

"In the wake of Macondo, we had many people from the bulk and the tanker segments come to DNV and say 'we are

very concerned about what happened in the Gulf of Mexico, because we are asking ourselves now, 'what could be our Macondo accident?' said Kenneth Vareide, Director of Operations North America Maritime, DNV. "What we see as a trend in this industry that even though your occupational safety trend is heading downward, you see that the insurance claims on the bigger events are going in the opposite direction. So while you have addressed occupational safety issues, have you taken away the bigger events? The analysis and statistics say no." In short, Vareide contends that there is a demonstrable trend toward fewer but much larger events. And while many have referred to the Macondo accident as a 'Black Swan' event, Vareide contends to the contrary, noting that in the case of Macondo, everyone knew that a blowout was the top event, and a potential issue, despite eight barriers being in place to prevent it. The key, according to Vareide, is not simply overall risk management, but detailed 'barrier management.' "What we (at DNV) are looking at is different techniques for managing risk; we are looking at the threats and defining what could be the top event … a blowout, a grounding, a fire. So when you look at these threats, you can examine the barriers that are in place to mitigate that event, and in the event that it happens anyway, what barriers do you have to place to mitigate it from escalating."

"HARD" VS. "SOFT"

When talk turns to classification, traditional thought turns to the "hard" side of the industry, the physical structure of the ship and the overall make-up of the physical machinery systems that collectively work in unison to enable operation. But regulation, starting with the ISM Code and continuing through the looming Maritime Labor Code, has increasingly mandated a change in conversation, thought and action.

"Beginning with the introduction of the ISM Code, class has moved substantively past its traditional role of establishing, applying and verifying conformance with engineering and technical standards, whereas traditional class activity was very hardware focused," said ABS's Weirnicki. ABS addresses these emerging needs through its investment in Nautical Systems (see related story on page 18 of this edition).

"The ISM Code brought new "software" responsibilities that initially addressed auditing the on-board management systems. This has progressed to include the auditing of a vessel's security management system and will soon be further

extended with the pending adoption of the Maritime Labor Code," said Wiernicki. "These regulatory initiatives have highlighted the importance of the human factor in maritime safety and, although we carry out these functions as a recognized organization acting on behalf of a flag State, they have led to a significant change in our own way of thinking – from establishing new standards for crew habitability to the assessment of risk across a broad spectrum of ship and offshore related issues. These have, in turn, also encouraged us to successfully offer an ever widening range of fleet management software systems, designed to help the master, chief engineer and crew to better and more safely manage the key operational aspects of the ship or offshore rig."

ClassNK's Ueda concurs: "With the ratification of the ILO's Maritime Labor Convention on the horizon, classification societies are now being called upon to survey and certify the working conditions of seafarers, In the same vein, At the same time, with ship operation becoming an increasingly technical skill, and with growing demand for high quality seafarers, classification societies are also becoming increasingly involved in training as well. At ClassNK we started our ClassNK academy program in 2009, and more recently have started certifying maritime training courses as well. We issued our very first certification for a training course to NYK Shipmanagement this September, and I think this is an important shift in terms of class societies' role in the industry."

Uwe Bullwinkel, Germanischer Lloyd (GL)

"The growing emphasis on reducing the environmental impacts of shipping, whether it be the EEDI/SEEMP, the introduction and expansion of emissions control areas, ballast water regulations, new guidelines for the recycling of ships and inventory of hazardous materials, even noise and vibration reduction mean that almost every aspect of a vessel's design and operation will be impacted over the coming years."

CHICKEN OR THE EGG: RULES OR TECHNOLOGY FIRST?

A common concern among class, and in fact the industry as a whole, is the notion of regulators creating new rules with emission mandates that currently exceed the capability of technology. Prime examples are emerging rules in air emissions and ballast water technology.

"It is an interesting question because I think we have found, in some regards, legislation is leading technology, particularly when it comes to ballast water management, for example," Protheroe said. "You see this on emissions technology, as well, particularly with scrubber technology, for example. The owner is faced with a massive capital expenditure in these new technologies. But I think there are some big questions and challenges, particularly regarding growing confidence that the technology will meet the requirements of the legislation."

DNV's Variede took it one step further. "There has been a shift in industry, and not just in the big corporations. Smaller companies are now being much more proactive (in identifying and adopting new technologies). On the other side of the coin, compliance management has never been as tough as it is today, mainly because the new regulations are coming from so many different places, from the U.S. Coast Guard to individual states, and increasingly from the European Union," Variede said. "Look at Ballast Water Technology. There are many companies providing Ballast Water systems, and frankly, many of them you have never heard of. As a shipowner, you are investing your company; but do you know that the (BWT) company and technology will be there in 10 years? This is probably going to be the biggest investment that the shipping company has ever made, and it is going to be a very important decision for the financial health of your company to install a safe, reliable technology that will be able to be upgraded in 10 year's time." It is then the role of class, he believes, to help owners stay ahead of the technology curve, to plan for what is coming next and make them (ship owner/operators) prepared. "Now you are seeing regulations putting expectations on technology. How you are going to meet these in a safe and reliable manner is the question."

THE MORE THINGS CHANGE …

As class and the maritime industry evolve in tandem, each organization stressed the importance of maintaining the traditional strength of its original mandate: the quality inspection and certification of ships sailing the world's waterways. "One of the key fundamentals is ensuring that we maintain frontline surveyors of the highest quality, "said LR's Protheroe. "In my mind, now more than ever, our clients need a high level of technical expertise and knowledge on the front line,

Noboru Ueda, Class NK (NK)

"On the GHG front, for example, we have committed some $28mto help develop new GHG emission technologies for use in the maritime sector. We are proud to be able support research on a wide variety of really remarkable projects, and I think our commitment to supporting the maritime industry, especially via R&D, represents the very best of our organization."

going onboard ships to give the owners and the flags a high degree of confidence. If a ship has a problem, there needs to be somebody there that can be trusted and relied upon to help provide a solution. The commercial pressures today are much bigger than they were 10, 15, 20 years ago."

ABS' Wiernicki maintains that the core of ABS can be summarized in one word: Safety. "Even as we move into our 150th year here at ABS, despite any of the changes in the external market or our internal structure, we remain mission-focused," he said. "Operators are looking for solutions that maximize energy efficiency in conformance with the new EEDI standards. But these should not compromise safety by, for instance, leading to underpowered vessels or adversely impacting operational maintenance. The technical knowledge of the major class societies should be recognized and harnessed to develop practical solutions that enhance safety while enabling our clients to demonstrate conformance. Simply put, safety and innovation can and must go hand-in-glove."

CLASS: BY ANY OTHER NAME

Vessel owners tend to view class as homogenous, but each organization has its own particular personality and expertise. At the same time, today's vessel owner has more choices than ever when it comes to classification. And, there is no way around the fact that class has evolved to something more than it ever was and today continues to change in ways we couldn't have imagined possible a mere ten years ago. Ultimately, those changes involve more responsibilities for class; and in turn, a heightened level of accountability to their clients.

The International Association of Classification Societies (IACS) – the gold standard for today's version of class – defines the role of classification organizations as one that "provides classification and statutory services and assistance to the maritime industry and regulatory bodies as regards maritime safety and pollution prevention, based on the accumulation of maritime knowledge and technology." Since more than 90% of the world's cargo carrying tonnage is covered by the rules and standards set by the thirteen Member Societies of IACS – including those interviewed in this article – these are words to remember. The business and regulatory climates of tomorrow will no doubt take class on many other journeys. Whatever that entails, and no matter how it is packaged, all of these organizations will still be grounded by their connected principles and remain, "Class: by any other name."

DNV

Based on Safety: Driven by Innovation and Development

DNV is a global provider of services for managing risk, helping customers to safely and responsibly improve their business performance. An independent foundation since 1864, DNV's purpose is: safeguarding life, property and the environment with a Vision of: Global impact for a safe and sustainable future. DNV values are: building trust and confidence; never compromising on quality or integrity; commitment to teamwork and innovation; caring for customers and each other. Today the organization has almost 9,000 employees in 300 offices worldwide of which about 30% comprises Ship and MOU classification services.

DNV has always focused on renewing its knowledge and setting new standards. These efforts are based on ideas from creative individuals in the global organization or generated by interaction with key customers. In setting new standards and providing safe and practical solutions for customers and industry alike, goals are aligned with purpose, vision and values. Those goals and values are reflected in 6 key areas, as set forth below:

SAFETY FOCUS

The human element has been identified as a key challenge, and DNV has developed an insight tool to benchmark safety culture in a shipping company to identify key improvement areas. Using experience with measuring and benchmarking safety culture, this enables companies to take specific measures in reducing their exposure for serious maritime accidents. By combining risk methodology, technology expertise and in-depth industry knowledge, the customers can safely and responsibly improve their business performance.

LOW CARBON SHIPPING

Natural gas is now gaining recognition as part of the low carbon economy. DNV has extensive experience from the upstream production of gas, through its processing and pipeline transportation or its liquefaction and shipping for regasification, to its use as a clean transportation fuel. By accumulating results from a number of research projects and experience gained from energy efficiency studies, DNV takes a leadership role in green shipping.

In 2000, DNV helped developed the first prototype LNG fueled pax/ro-ro ferry "GULTRA" and published rules for "Gas Fueled Engine Installation". Last year, the rules were adopted by the IMO Interim Guidelines with similar technical contents. Today this proven technology has evolved into 23 vessels in operation, 17 on the order book and 2 conversions for short sea shipping, 95% of which are classed to DNV. This was developed further to ocean going ships. In April 2010, DNV revealed the concept design of "Quantum" an innovative 6210 TEU container ship which developed later to 9000 TEU. For the container vessel segment, expected to expand rapidly in coming years, this is a cost efficient, concept optimized to allow maximum space utilization, minimum fuel consumption, minimum ballast water requirement and increased safety.

The lead on LNG and innovation was taken further with the development of "Triality" a green VLCC that fulfills three main goals: Environmentally superior to conventional VLCCs, technically feasible and economically attractive. The low temperature of LNG is further used to re-condense the VOC, lower the main engine scavenging air thereby increasing its efficiency. Ballast-free is accomplished by making the hull V-shaped. In Sept 2011, the "Triality" received the Lloyd's List Global Award for the shipping industry's best innovation project 2011.

A CULTURE BASED ON INNOVATION

Following its innovative culture, another concept was developed for an ore carrier "Ecore". This features the benefits of a more V-shaped hull form offering reduced ballast, one centre hold for efficient cargo handling, a self-loading system for increased efficiency, two stroke ME-GI gas engines with full fuel flexibility, enhanced environmental performance and other cost efficient solutions.

DNV and Oshima shipbuilding partnered in the development of a series of "ECO-ship" bulk carriers for delivery beyond 2020. Besides LNG propulsion, a range of existing

(Courtesy DNV)

The human element has been identified as a key challenge, and DNV has developed an insight tool to benchmark safety culture in a shipping company to identify key improvement areas. Using experience with measuring and benchmarking safety culture, this enables companies to take specific measures in reducing their exposure for serious maritime accidents.

and emerging technologies are deployed to give 50% more efficiency. These include: Large twin screw propellers, optimized hull lines, air lubrication under hull, low-friction paint, reduced ballast water design, high efficiency electric-driven cranes, SCR installation for 2-stroke engine and wind sail system.

OFFSHORE CLASS

DNV's strong position in deep-water and harsh environment drilling rigs and FPSOs provides a solid foundation for an emerging market and technology that is just a decade year old. On FSRUs and FLNGs, DNV leads with almost all projects totaling more than twenty projects. In March 2011, DNV published an Offshore Technical Guidance, OTG-02 for Floating Liquefied Gas Terminals. The contents include Floating gas concepts, Structural design, Key safety and technology issues, Conversion of gas carriers to LNG FPSOs or FSRUs, Class maintenance and inspection philosophies, Classification and regulatory compliance.

COLD CLIMATE

Maritime transportation of oil and gas in Arctic areas will increase in the future. As this is an area classified as ECO sensitive, safe and reliable operations are of vital importance. DNV is a pioneer in risk management in Polar Regions, with its work dating back to the early days of Arctic and Antarctic scientific exploration and the exploration vessel "FRAM", 1892. Since 1881, DNV has delivered technical knowledge and developed standards for ice class shipping. Its geographical home location in Norway has given the opportunity to build unique cold climate shipping and offshore experience.

Full scale ice load monitoring in keeping the bridge informed about the loads has been successfully completed. This monitors the actual ice loads on the hull and presents the response as a "utilization factor" on bridge display while stored in a computer.

In 2010, DNV was a key player in the work group for the Barents2020 project. The group identified a need for change in existing maritime and offshore oil and gas standards for escape, evacuation and rescue (EER) operations in the Barents Sea with recommended proposals. It took into account the Russian and Norwegian experience with cold climate operations of ships in Arctic and sub-Arctic conditions, including the Caspian Sea and offshore Sakhalin Island. The study concludes with mitigation measures and recommendations.

ACADEMY FOR NORTH AMERICA

In 2010, following feedback from customers, a dedicated maritime academy was created. DNV has a long history in providing training to its customers. The North America Maritime Academy is a virtual training academy – an "academy in a suitcase." Its goal is in providing training and competence necessary to successfully sustain and grow a quality organization. Drawing upon the technical knowledge and experiences from its highly trained personnel world-wide, DNV helps companies to bridge competency gaps that may exist. Best practices from its experiences in the maritime industry are incorporated to create effective targeted training. An example is the Superintendents course which goes hand-in-hand with DNV's web based Superintendents Manual; www.superintendentsmanual.com (a maritime encyclopedia) designed to provide instant access to best practices, regulatory requirements and policies. In addition to classroom courses, customized training for individual companies can be arranged. The 2012 training schedule and catalogue can be found at: www.dnvusa.com/NAMaritimeTraining

BRINGING IT ALL TOGETHER

In navigating today's tough market environment, DNV believes in strengthening customer support, continued investment in R&D, development and innovation. It has undisputable competence and a wide range of services to offer. Being the best value provider is, and will always be a key area for shipping companies. Based on best practices from different industries DNV has developed approaches for supporting shipping companies to both reduce cost, and improving reliability and safety of vessels. Key areas where DNV specifically supports industry include: fuel cost, maintenance cost and improve efficiency of procurement. Project examples show significant savings realized with applying more modern philosophies and approaches within the focus areas.

Excellent customer service and responsiveness to their needs together with a focus on people, technology and innovation are what DNV believes are the key ingredients for a winning culture in setting new standards and providing safe and practical solutions for its customers and the industry.

The Author

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LR

Managing Risk and Addressing Environmental Change

Lloyd's Register may be the original classification society, but today it is the most diversified. Number two in fleet size, it also has the largest network of surveyors and offices worldwide. Lloyd's Register's breadth of capability is demonstrated by its large market share of all ship types. And it is significant that the two ship type segments where it is clearly the leading society – in LNG and in cruise ships – are the two sectors where safety, risk management, environmental performance (and comfort) are most valued.

Lloyd's Register also prizes its independence. Free from vested interests or national self-interest and concerns, Lloyd's Register is impartial and apolitical. As a charity, all surpluses made are not paid out as dividends to shareholders but are invested back into the business – supporting training, education, research and development.

LR'S BALANCE: PROFITS, ENVIRONMENTAL PROTECTION AND SERVING SOCIETY

The core competency of class, the design approval and the surveying of ships, is now more competitive than ever. Class is needed more than ever both for the nuts and bolts of surveying but in a more globally competitive world, while standards have risen across the board, some clients are always looking for more. Where Lloyd's Register seeks to stand apart is in providing expertise and leadership in rules and standards development, research, innovation, failure investigation and many more areas of specialist marine and offshore expertise. Such expertise is vital in dealing with the big issue of our times – business sustainability: finding the right balance between profitability, environmental protection and serving society.

The leading sustainability issues are the rising price of fuel and questions over how best to comply with new emissions regulations and comprise much of the work and focus for Lloyd's Register, today. Tom Boardley, Lloyd's Register's Marine Director, says, "One area where we really do provide more to the industry is support, research, guidance and our practical services in helping with the fuel and efficiency challenge."

Boardley says that there are many competing technologies and life is tough for owners now, "How do you decide what to do? Most deep sea ships, both in the water and under construction were designed in a much cheaper fuel oil price environment – nearer $100 a ton than today's $600 - $700 price range."

"We have for a number of years talked of a paradigm shift

Lloyd's Register's Environmental Roadmap Schematic

and that one size will no longer fit all – and we now see this language becoming accepted wisdom in the industry. It seems that the idea you can build ships for world-wide trading for 25 years - or more - and be confident that the technology and approach to energy will remain competitive on a global basis through that lifetime, may be over. One design for world-wide trade may return but probably only after a period of change when new orthodoxies might emerge."

MARINE FUEL: EMISSIONS, PRICING AND SO MUCH MORE

Lloyd's Register identifies two inter-linked issues. Firstly, with high fuel prices, ships could become either uncompetitive or obsolescent well before their anticipated design life expires – we are seeing this with containerships and, quite quickly now, with tankers. Secondly, new emissions regulation will see different solutions adopted by different ship types and in different geographies.

FUELS OF THE FUTURE – GAS IS ONE OF THEM

What fuel the industry will use is occupying many minds and Boardley says there are no simple answers. "Clearly there has been a lot of debate about LNG and we see a great deal of potential for it as a marine fuel. We are involved in some big projects and talking to many operators on the subject. Most applications to date are small, coastal projects and our opinion is that LNG is most likely to be adopted in coastal, and particularly, ferry applications where the operator has control over bunkering facilities. Use for deep sea is more complicated and will take longer."

Lloyd's Register points out that while emissions from LNG systems are far better for local air quality, gas is just another fossil fuel - even if claims that LNG will marginally reduce CO2 are accurate (an area where more work needs to be done from gas well to flue) the growth in world trade will erode any net greenhouse reductions from its use.

Boardley adds, "Gas is one of the fuels of the future – perhaps not the fuel. Whether it is widely adopted will depend on whether a global market and infrastructure for gas emerges – and that's a long way off. And then it will come down to price. Many operators will be looking for flexibility and a modern 'tri-fuel' engine able to burn HFO, diesel or LNG may be an attractive option."

COMPETING AGENDAS REQUIRE GOOD DECISIONS

"There are many competing agendas out there as we enter this time of uncertainty', says Boardley. 'At Lloyd's Register we want to help ensure that the shipping industry is making

"Gas is one of the fuels of the future – perhaps not the fuel. Whether it is widely adopted will depend on whether a global market and infrastructure for gas emerges – and that's a long way off. And then it will come down to price. Many operators will be looking for flexibility and a modern 'tri-fuel' engine able to burn HFO (spell out), diesel or LNG may be an attractive option."

– Tom Boardley, Lloyd's Register's Marine Director

the best decisions based on the best possible information. Our job is to focus on the facts around safe, efficient marine technology - rather than pushing or preferring any particular technology."

Lloyd's Register is looking at the issues of sustainability from a very broad perspective with services, research and development at many levels and across many subjects. Helping owners understand the EEDI and SEEMP requirements, to improve their trim characteristics, provide award winning training as well as advanced strategic research in biofuels, fuel cells, nuclear power, LNG containment, noise and vibration, the human element - and so on.

Boardley concludes, 'The marine world has changed dramatically in the last 10 years. The world fleet has doubled. China has come of age - we now have 450 staff in China. Now we will see substantial evolution in ship design. Owners, yards and regulators are looking for help in all areas. We are even trying to help with the scourge of piracy – which is not really our domain area - but we are helping where we can, with technical advice around citadels, for example.

"But as well as technical leadership we will become more influential in 'human engineering'. Everything comes down to people making good decisions. Increasingly safety, sustainability and engineering systems, come down to ensuring that people are making good decisions. This is what we try and do every day."

ClassNK

Classification Takes Center-Stage in Environmental Innovation

Green House Gas reduction is the single greatest challenge facing the maritime industry, according to Noboru Ueda, Chairman and President of ClassNK and past Vice-Chairman of the International Association of Classification Societies (IACS) Council. It is a challenge he feels will require classification as an industry to adapt and play a new role in the industry, much as it has adapted over the past 250 years since its founding.

CLASS EVOLVING

Although class has a history that stretches back to 1760, it was not until the development of Safety of Life at Sea (SOLAS) and the International Convention on Load Lines (ICLL) during the first half of the last century that classification societies moved away from simply carrying out inspections based on their own rules, to becoming international regulators carrying out surveys on behalf of flag states around the globe.

The traditional focus on ship construction has changed through implementation of such protocols as the International Safety Management (ISM) and International Ship and Port Facility Security (ISPS) codes and more recently the adoption of the International Labour Organization's Maritime Labour Convention.

Mr. Ueda believes the industry is on the cusp of another great change which will see class societies serve not only as regulators but also innovators, who are directly involved in maritime development.

The 13-member IACS, which classifies more than 90% of the world's commercial fleet, has played an important role in setting the stage for this transition. After the Erika and Prestige casualties fuelled demand for more rational technical regulations for tankers and bulk carriers, IACS created the IACS Common Structural Rules, which are now the global standard for tanker and bulk carrier construction.

LEADERSHIP: FROM THE TOP

Mr. Ueda, who served as the Chairman of the IACS Council from July 2010 to June 2011, has been clear about his high expectations for the industry. As IACS Chairman he laid out three goals for his one-year term: to complete the transition to a more transparent IACS structure, to make proactive technical contributions to the maritime industry and the International Maritime Organization and to better reflect the needs of the global maritime industry. To that end, the transition to a more transparent and open structure resulted in the admission of the Croatian Register of Shipping (CRS) and the Polish Register of Shipping (PRS) as members on May 3 and on June 3 this year.

IACS' commitment to GHG emission reduction took centre-stage at the IMO when Green House Gas reduction and the IMO's Energy Efficiency Design Index (EEDI) scheme were discussed at the 62nd session of the Marine Environmental Protection Committee in London in July. Addressing concern about the potential impact on ship safety, given that one means of lowering GHG emissions at the design stage is to reduce vessel speed; IACS developed a set of draft proposals for establishing a minimum speed requirement for vessels and submitted them to the IMO for consideration. In addition, IACS established a joint working group with global shipowners' and shipbuilders' associations including BIMCO, Intercargo, Intertanko, OCIMF, CESA, CANSI, KOSHIPA, the ICS and SAJ, with the aim of developing new guidelines for ensuring smooth implementation of the IMO's EEDI scheme.

MORE THAN CLASSIFICATION: PARTNERSHIPS

Mr. Ueda also proposed that IACS should invite Asian shipbuilders' associations such as the Asian Shipbuilding Experts Forum (ASEF) to participate in a variety of meetings including the Joint Working Group / EEDI, the External Advisory Group for Harmonized CSR, and the industry session at the

As the world's leading classification society with more than 7,560 vessels of 190m tons gross, representing 20% of the world's commercial tonnage on its register, ClassNK is committed to becoming a leader in the development of new green technologies for the shipping industry. Looking to lead by example, one of the main elements of this approach is its Joint R&D for Industry program which started in 2009.


Noboru Ueda, Chairman & President, ClassNK

IACS winter Council meeting in order to bring representatives from the entire maritime industry to address the challenges of securing a safer future for the maritime industry.

Mr. Ueda believes that classification societies, as independent third party organizations, can serve as a bridge between not only companies in the same sector, but also across vastly different sectors of the industry. Moreover, in their role as technical organizations dedicated to research and development, class has resources to support industry-wide efforts to reduce maritime GHG emissions. However, he suggests it is necessary for classification to make a bold jump from being a regulator to a becoming a partner and innovator in developing technology in order to create a greener future.

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R&D: CATALYST FOR INNOVATION

ClassNK commits more than 10% of annual turnover to R&D and whereas in the past it focused efforts almost entirely on classification-related projects such as development of new rules its new program is a catalyst for innovation. The society is supporting a wide range of projects being carried out by maritime companies, and by providing research funds and technical support for these projects it is creating a new kind of maritime cluster and triggering change throughout the industry. ClassNK has completed 17 different research projects as part of this programme since 2009 and another 78 projects in progress. Nineteen of the projects ClassNK is supporting are part of a Japanese national effort being carried out jointly by the Japanese government, maritime companies and maritime non-governmental organizations such ClassNK, to reduce maritime emissions from vessels by as much as 30%. ClassNK alone has committed more than $28 million to this project in the last four years – almost a quarter of the program's total budget.

The projects chosen for inclusion as part of this program are expected to be completed by 2013 and the technology being developed will be available for use by the wider maritime industry. Projects being carried out as part of this program include optimizing hull forms, reducing hull friction, improving propulsion efficiency engine efficiency and waste heat recovery, hybrid electric power and improving operational efficiency.

REVOLUTIONARY POTENTIAL: SPECIFIC APPLICATIONS

According to Mr. Ueda, the technology being developed has the potential to revolutionize the maritime industry. The Air Lubrication System, for instance, produces small air bubbles that reduce the friction between hull and ocean, thus reducing the energy required to propel the ship and reducing GHG emissions. The system has been installed on two heavy lift vessels and testing at sea trials has shown a reduction in emissions of more than 10%. Efforts are underway to apply the system to bulk carriers and other types of vessels.

The new hybrid turbocharger system combines a traditional turbocharger with an electric generator in a single unit. As a result, it is possible to eliminate the need for additional diesel electric generators aboard the vessel. This saves space in the engine room, cuts construction and maintenance costs and it also reduces GHG emissions by some 3%. This system has been tested on a bulk carrier delivered earlier this year.

The hybrid power Photo Voltaic Cell and Large Capacity battery system makes use of solar energy and an advanced nickel hydrogen battery system. This system was installed on NYK's eco-ship Auriga Leader in June and it can provide upwards of 2% of the vessel's energy needs.

By combining advanced battery technology with solar panels, it becomes possible to make solar power a safe and stable energy source for maritime use, and ClassNK expects this technology to open the door to the widespread use of solar power on ships.

RINA

Knitting a Green Thread: Italian Classification Society ramps up for the next 150 years.

Italian classification society RINA is 150 years old this year, and it is celebrating its landmark anniversary by revamping its internal organization. "We began as a ship classification society in Italy, but as the needs of our clients change, we have to change too," explains Ugo Salerno, CEO, RINA. "We are reacting to three specific trends. Firstly our client base is growing fastest in countries where the economies are growing. So we have to be on the ground there, delivering global services with local staff. Secondly our clients are no longer seeking simply ship classification. They want a wide and increasing range of services, and they want them delivered coherently through a single point of contact. So we have to create a multi-disciplinary structure within RINA to deliver that. And thirdly, and running through everything we do, is the demand for sustainability. We have to knit all our services together with a green thread and help our clients to reduce their global impacts."

GLOBALIZATION MEANS GOING LOCAL, TOO

RINA's drive to globalize and go local has led to rapid growth in China, where emerging private shipowners now class more than 120 ships with RINA, including newbuildings in Chinese yards. "We went into China, trained local staff and are now active in every area of industry, transportation and environmental protection," explains Salerno. "We reach out globally to help companies which are also globalizing, as so many are in China. We help by bridging the gap in competency for newcomers to the global market place to boost their competitive capacity on the global market."

The drive to be local means that today, while RINA has Italian roots, its 1,500 staff are made up of 46 nationalities. "We know that our people and their skills are what our clients need, but we also know they no longer simply need them in defined and limited areas. They want to work with us across a range of fields," says Salerno. "For example ENI, an oil company, uses us for supplier qualification, pipeline certification, anti-bribery systems, research and development of specialist vessels for Caspian Sea services and a host of other things. That is why we are sweeping away the silos within the company to create client-focused teams, specific to that client's global needs, rather than having divisions focused on marine, or industry or certification.

Ugo Salerno, CEO, RINA

MULTI-DISCIPLINARY TEAMS: RINA & TRUST

According to Salerno the process of multi-disciplinary team working began with RINA's multi-faceted role in the development of the first permanent offshore gas terminal, the Adriatic LNG. That is now on stream delivering 8 bcm of LNG per annum and work is well in hand on the world's first true floating offshore FLNG terminal, the 3.75bcm per annum OLT Offshore Livorno project. For both projects

RINA has provided a range of services, including traditional ship classification, marine warranty, site surveys, meteo marine studies, authority and owner engineering, ship handling simulation and regulatory compliance and security training and outsourcing. "We realised that the clients were buying trust, and it was the RINA name that delivered that. So we brought the experts we needed under one umbrella for each project. Last year revenue from multi-disciplinary teams was up over 70 per cent, so now we are formally changing the company structure to deliver all services in the same matrix-based way," says Salerno.

SUSTAINABILITY – THE STRONG GREEN THREAD

That service delivery will all be linked by a strong green thread. "It is not just about ship emissions, and fuel efficiency, although we are helping shipowners with that," explains Salerno. "It is about sustainability across the whole range of human activity. For instance, at the macro level we are now one of the world leaders as an accredited body under the UNFCC in Climate Defence Mechanism validation, with over 300 on-going projects around the world. At a human level we are deeply involved with food sustainability and in the US for example we have certified the Alaskan salmon fisheries on behalf of Friend of the Sea, an association which operates according to the FAO guidelines for sustainable fishing. At the energy level, we are helping to engineer carbon capture systems for coal fired power stations and providing a range of services to photo voltaic power generation schemes. And in shipping and yachting, we are helping owners to be both cleaner and greener and also more business efficient."

The environmental focus includes working with buildings to reduce energy consumption and local impacts. "We have helped Italy's biggest real estate management firms to reduce their buildings' impacts and save money. It is only a matter of time before we see shipowners realising they can save outgoings that way too. We already help them to reduce their impacts with ISO1400 certification across all their operations, so it is logical to include Green Buildings along with Green Plus ships," says Salerno.

Adriatic LNG terminal – an example of multi-disciplinary services for one client

"It is not just about ship emissions, and fuel efficiency, although we are helping shipowners with that. It is about sustainability across the whole range of human activity."

– Ugo Salerno, CEO, RINA

GREEN PLUS – MORE THAN ONE MEANING

One example of joined up green thinking is to combine environmental certification with health and safety systems. Italian shipping Group Ignazio Messina attained Environmental (ISO 14001) and Health and Safety (OHSAS 18001) certification for all its activities, including its logistics chain and for the same group RINA is overseeing the building of four highly sophisticated environmentally friendly ro-ro container vessels in Korea. The 45,200 dwt vessels will be the first cargo ships to have RINA's highest voluntary environmental certification, Green Plus. It will be awarded based on an environmental performance index which covers all aspects of the vessels' impact on the environment, including carbon emissions.

RINA's first Green Plus environmental notation in the cruise industry was awarded to the recently delivered 3,800-passenger vessel Costa Favolosa. Delivered by Fincantieri, Venezia Yard, to Costa Crociere, vessel exceeds the environmental requirements set down by international conventions. It achieved Green Plus status by scoring highly across the Green Plus scheme, with especially high scores in the areas of automated recycling, optimization of air conditioning, efficient devices to maintain the optimum draft and trim and by having a Green Passport.

RINA: DIVERSIFIED, GREEN, GLOBAL – AND LOCAL, TOO.

"RINA is already a strongly diversified group operating globally in almost all industries to deliver safety, environmental and quality standards. Our focus now is to invest in developing countries, China, Central Asia, Brazil, India are examples. We are also the European leader in fields such as social accountability, and see markets for those services growing, too," Salerno sums up. "So our five year plan is quite simple – to put people and services where the clients need them, and to identify our clients' needs across all industries, then work in a multi-disciplinary way to meet those in a way which knits them together sustainably."

Best Designs: End User Driven

Ballast Water Testing Platform Presents Unique Challenges for Naval Architects

by Joseph Keefe

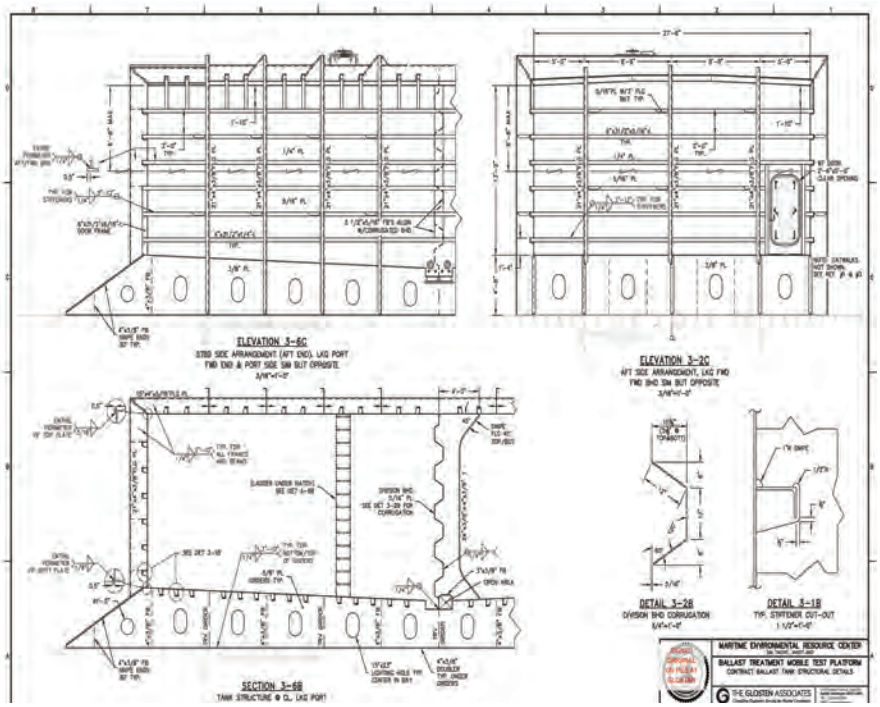
When the University of Maryland's Maritime Environmental Research Center's (MERC) looked to create a barge-based Mobile Test Platform for emerging ballast water technologies coincided, they turned to Seattle-based Glosten Associates for design and engineering services. But, the story entails a lot more than just ballast water technologies and testing. It's about naval architecture, stress and stability. How the successful project came together will be of interest to boat repair specialists, shipbuilders and naval architects.

The dedication of this new and arguably the most advanced BWT Mobile Test Platform is important for many reasons. A retrofitted barge that will allow ballast water treatment systems to be evaluated under natural salinities and biological communities from Baltimore, MD to Norfolk, VA, the unit is 155' long and 50' wide and has two large tanks that simulate ship ballast holds. Additionally fitted with sophisticated systems that can mimic high pressures and flow rates from large vessels, the barge is an ideal testing platform for emerging, as yet untested BWT technologies. According to MERC personnel, the leased platform cost approximately $2.5 million to assemble. It also involved quite a bit more than just dropping a bunch of equipment onto a generic barge platform.

The first task for Glosten was to determine the requirements of the end users and then provide designs to meet those parameters. The primary focus of the innovative platform is to evaluate the mechanical and biological efficacy, costs, and logistical aspects of ballast water treatment systems and to assess the economic impacts of ballast water regulations and management approaches. To that end, MERC established four main objectives for the barge:

- Provide technology developers/vendors with facilities and expertise for pilot-scale and shipboard evaluations of treatment systems;
- Provide regulatory agencies and classification societies with standardized, rigorous, and independent data on treatment system performance;
- Provide ship builders and shipping lines with information and decision tools to select the most appropriate ballast water treatment options; and
- Remove as much uncertainty as possible from emerging markets for treatment systems in order to accelerate the adoption of innovative technologies.

The testing platform comes along at a critical time in the BWT regulatory and policy struggles that characterize the ongoing, overarching effort to unify a global standard to eradicate the scourge of invasive species. According to Glosten's Kevin Reynolds, the development of the Mobile Test Platform was a successful project from the naval architecture perspective. Reynolds adds, "Unique challenges were resolved, and



"The project followed a typical design spiral starting with concept design, running through detail design work, and finally commissioning the platform. On the other hand, Glosten encountered unique challenges such as how to 'be gentle' to the organisms, provide easy to clean ballast tank internals, and adhere to flow control processes more typical in the manufacturing industry."

Kevin Reynolds, Glosten Associates

the completed platform has been well received by the operations team. On the one hand, the project followed a typical design spiral starting with concept design, running through detail design work, and finally commissioning the platform. On the other hand, Glosten encountered unique challenges such as how to 'be gentle' to the organisms, provide easy to clean ballast tank internals, and adhere to flow control processes more typical in the manufacturing industry."

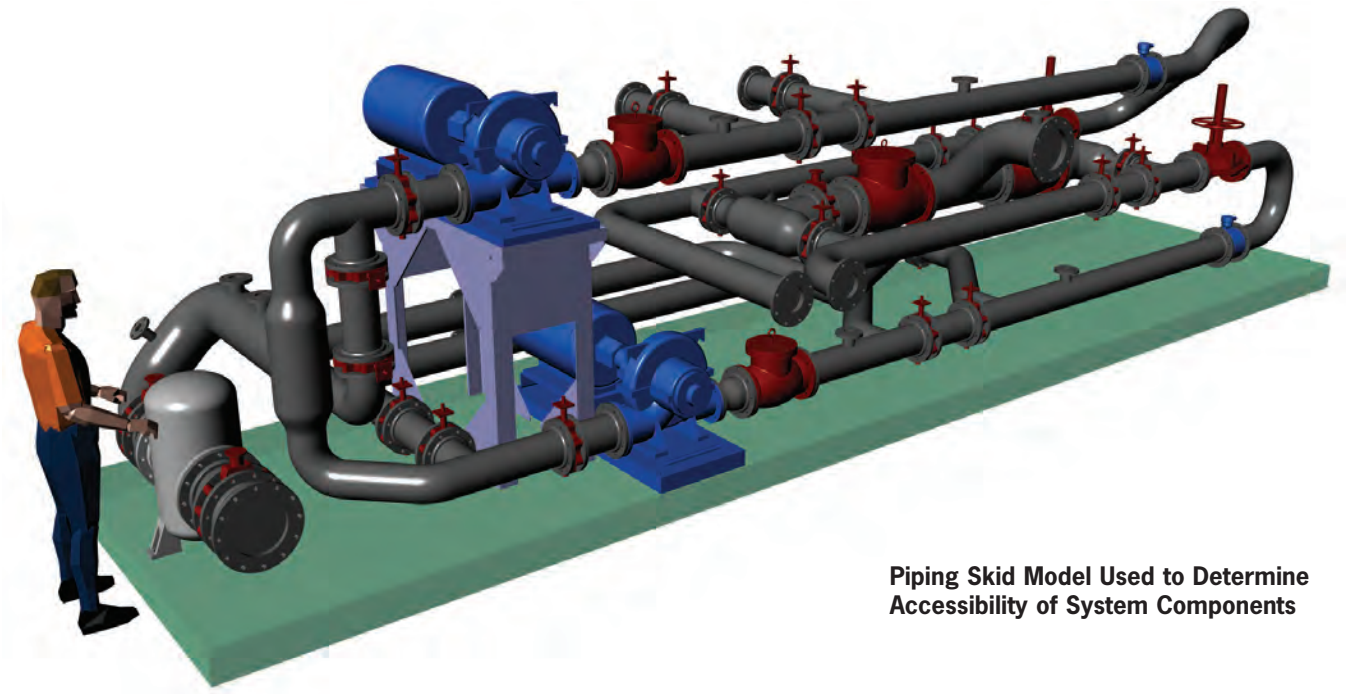
Starting with concept design funding provided by the U.S. Maritime Administration, Glosten's design and engineering team worked directly with University of Maryland Center for Environmental Sciences (UMCES) to develop the concept and establish the particulars. Significantly, Glosten was able to bring the experience that it had gained through the design, construction, and operation of a "half-sister" Golden Bear Facility that also tests ballast water treatment systems.

The concept design effort was successful. It was determined that the use of rectangular tanks would be more cost effective than round tanks as they required less space, and therefore a smaller, less expensive barge platform. Further, this approach enabled the outfitting of full sized doors and large hatches to access the tank internals. This would allow the tanks to be easily cleaned, limiting required labor hours during operations.

It was decided to use two parallel pumping systems to enable parallel uptake of treatment and control loops. Further, pump control would be established by matching pump speed to measured flow rates. The position of the tanks was determined, allowing space for removable laboratories, storage containers, and the treatment systems that would be tested. And, the height of the ballast tanks above the deckline presented stability issues that had to be considered carefully. The concept of using hoses for the sea suction was developed to allow variable sea suction heights, targeting either bottom or surface organisms in the water channel as desired.

Detail design efforts resulted in effective tank and pumping system designs. A piping skid was developed that would allow the system to be built and tested off-site and then trucked to the barge for installation. Tank structure was developed, placing structural member external to the ballast tanks and including a sloped tank bottom. These measures would reduce time for cleaning the ballast tanks, and allow the pumping system to completely empty these tanks.

Final efforts from Glosten were to provide commissioning support and training in the use of the platform by the UMCES team. Kevin Reynolds adds, "The best designs are developed with the end user in mind. The UMCES team did an excellent job of understanding the operating principals and applying their science processes to the completed platform."



Piping Skid Model Used to Determine Accessibility of System Components

3D Work Instructions

The Latest Development in Computer Aided Manufacturing

by Gary McCue

It's been nearly half a century since Computer-Aided-Design (CAD) began to emerge and replace the drafting table, set square and protractor that had been the tools of the trade for most of modern history. Since that time, many shipyards have implemented CAD systems that utilize 3D geometric representations, but they continue to use text based applications for planning, and work instructions. Shipbuilding is a dirty business, and without a clean and orderly shop floor, shipyards have never been in a position to make effective use of computer applications for work instructions. However, the ability to put 3D graphics, work instructions, material information, and other details on a mobile device suitable for the ship and/or shipyard environment is a game-changer. The introduction of lightweight tablets and other portable devices is enabling shipyards to reduce costs, improve quality, and minimize risks by utilizing 3D graphics for planning and work instruction.

ORIGINS OF COMPUTER-AIDED DESIGN AND MANUFACTURING

To understand the significance of 3D work instructions in the shipbuilding industry, it helps to understand the past. The origins of Computer-Aided-Design (CAD) date back to the development of surfacing applications for aircraft and automobiles in the 1960s. The following decade brought the first ship specific softwarein the form of computer-aided-lofting applications such as Autokon and SPADES. These applications required large mainframe computers running 32+ bit operating systems and requiring dedicated data centers with big air conditioners.

"Mini-computers," which were actually 5 foot tall machines with 16-bit operating systems developed during the 1980s, brought the cost to implement computer-aided-lofting within reach of medium-sized shipyards. CAD software was enhanced during this period to include drafting and solid modeling based on geometric primitives (cuboids, cylinders, and prisms).

In the 1990s, IBM's ThinkPad and Apple's Power MacIntosh were introduced, but due to their limited computing power, the CAD world was dominated by workstations with high performance processors, specialized graphics, integral networkingcapability and Unix operating systems. At the same time, software applications were being enhanced to manage the product lifecycle from concept to their end of life, a discipline now known as Product Lifecycle Management (PLM).

In the past 10 years, solid modeling using personal computers has come to dominate the world of computer-aided-design, and the advancements in computing power, widespread internet connectivity and introduction of various new devices is beginning to have a profound impact.

TODAY'S 3D CAD MODELS

Solid modeling is used to define products that range from cell phones to ships. Mechanical solid modeling applications define all objects as generic parts that are assembled to create the final product. However, specialized applications have been developed that classify parts as a particular object type such as a plate, shape, pipe, valve, pump, duct, motor or cable. These applications have been customized with discipline specific tools for structures, piping, HVAC, and electrical that create and manage discipline specific object-shaving a unique set of attributes similar to those in figure 2 which provides planning and manufacturing with much richer data.

3D CAD data may not exist for some older ships still in operation, but 3D work instructions can still be a valuable tool for these vessels once that data is created. One way to create a 3D CAD model of a ship built before the advent of 3D solid modeling is to use laser scanning. This process is widely used in the architectural and construction industries to create 3D models of existing structures and terrain. Laser scanning creates a cloud of points by measuring the distance from the camera to thousands of points on the object being scanned. Software is used to integrate scans taken from multiple reference points into a set of surfaces which define the outer envelope of the scanned object. A 3D model is created by associating the resulting envelope to a part with attributes.

PRODUCTION PLANNING

The concept of Products, Processes, and Resources (PPR) has been implemented by a large number of companies across the industrial spectrum. PPR builds on the 3D CAD model by adding the manufacturing Processes and Resources required to manufacture the product. When applied to shipbuilding, the product can be the entire ship, or any of the thousands of interim products (e.g. manufacturing assemblies) that make up the ship. Processes include marking, cutting, bending, machining, assembly and installation, and resources include cutting machines, rolls, presses, staging, jigs, cranes, people and anything else used to build a ship, but are not delivered as part of the ship. Additional manufacturing information can be linked to the products, processes, and resources in the form of attributes or document links to feed downstream applications.

CAD Based Computer Graphics Animation.

One of these applications is called "work instructions." The concept of using the PPR data to semi-automate work instructions was pioneered by the automotive and aircraft industries. These applications linked textual instructions and related documents to the manufacturing processes and resources. The instructions could be selected from a library or entered manually and were often linked to standard processes that were used frequently.

3D WORK INSTRUCTIONS

Traditional work instructions have always included fabrication or assembly drawings. Early attempts to replace drawings with the 3D model for work instructions were hampered by the memory and processing power required to display a reasonable sized assembly. The Japanese developed a light-weight graphics format called XVL to address this problem. XVL requires far less memory and processing power than the feature based graphics used to design the product, while preserving the dimensional accuracy required by manufacturing processes. Others solved the problem by adopting techniques created for the electronic games industry where a texture is mapped to a surface or envelope representing the part or parts in the assembly. This mapping technology provides a very realistic rendering suitable for still images and animations. The example shown in the depiction above is an image from an animation created for decommissioning a drill rig. Animations such as these have become commonplace in other industries, including the energy industry.

The introduction of lightweight graphics has made it feasible to create work instructions using 3D representations of the large assemblies typical in shipbuilding. When integrated with a process plan, the creation of 3D graphical images can be automated. Add editing tools developed for creating technical publications to annotate the images with the requisite dimensions, part numbers and notes as shown in figure 5, and the task of creating 3D work instructions becomes simple and straight forward. With all these advances in software, only one problem remained – how to get the graphics onto the shop floor and on board the ship.

THE INTRODUCTION OF TABLETS

Recent advances in mobile computing

have transformed the telecommunications industry and tablets are making inroads into the personal computer market. Several companies are making ruggedized tablets that will withstand the rigors of the working world. Tablets are now available withmetal frames, Gorilla glass displays, protected ports, cameras, hard drives and hot swappable battery packs that are MIL-STD-180G and IP52 compliant.

Tablets are becoming popular in the medical records and energy industries where mobility is important, but the advent of tablets that meet military specifications, means that the application of 3D work instructions is no longer limited to situations where the work comes to the computer. It is now possible to take the computer to the work. A tablet based application for inspection being prototyped at Airbus is shown in figure 6.

PULLING IT ALL TOGETHER

The following scenario and work sequence is now a reality:

1. *An intelligent 3D CAD model is created for the ship using a 3D CAD application and/or laser scanning.*

2. *The block, unit and spool boundaries are defined.*

3. *The planning department uses the 3D CAD model to plan the construction. The requisite assembly processes are defined and the appropriate parts, assemblies are assigned to the processes.*

4. *Resources are assigned to the assembly processes.*

5. *The planning application examines the geometry of specific object types, and generates the fabrications processes required to create the individual parts.*

6. *Resources are linked to the fabrication processes*

7. *The assembly and fabrication processes are sequenced and linked to the appropriate stage of construction.*

8. *Simple animations are used to verify the process plan and obtain the agreement of the production departments.*

9. *Dates are assigned to the operations by linking the process plan to the construction schedule.*

10. *Resource loading is analyzed and the process plan is modified as required.*

11. *Light-weight 3D graphics representations of the interim products are generated based on the process plan.*

12. *Trade planners supplement the information in the process plan with the requisite instructions and enhance the 3D graphics representations as necessary.*

13. *Work instructions and all related information is extracted from the database just-in-time and downloaded to a tablet.*

14. *The tradesman reports for work and picks up his tablet with all the information required to perform the assigned task.*

BENEFITS

3D work instructions have several advantages over traditional paper solutions. The benefits multiply when 3D work instructions are coupled with mobile computing devices such as tablets. For example:

- *It possible to collect all information related to the task on hand including bills of material, purchasing information, design drawings, fabrication drawings, specifications, 3D images, training videos, machine setup data, and work instructions in one place.*
- *Applications are available to configuration manage all the electronic data required to build, overhaul and maintain a ship including the work instructions.*
- *The 3D graphics can be generated automatically based on the process plan.*
- *The information linked to the products, processes and resources can be used to annotate the 3D images and avoid redundant data entry.*
- *3D images are more intuitive and easier to comprehend than traditional drawings. This translates into fewer mistakes which means reduced rework, less cost, and fewer man-hours.*
- *Light-weight graphics and mobile devices makes it possible to take the electronic data to the work site instead of forcing the work to come to the computer.*
- *There are no paper drawings, specifications or instructions to create and manage.*

The Author

Gary McCue is a Senior Consultant for the Shipbuilding Industry at Dassault Systèmes (DS) where he assists customers implementing Product Lifecycle Management (PLM) technologies. Gary holds a BS in Naval Architecture and a BS in Marine Engineering, and is a member of The Society of Naval Architects and Marine Engineers (SNAME) and the American Society of Naval Engineers (ASNE).

Maritime Professional

2012 Editorial Calendar

Q1 Training & Maritime Security

Ad Closing: Feb 15th

Publish: March 2012

MarPro explores the most important aspects of ocean shipping today. Maritime training, safety, regulatory compliance and crew welfare will all be covered in detail. Learn how port security and anti-piracy measures will protect your people, physical assets and ultimately, your bottom line.

Bonus Distribution:

CMA Shipping
March 19-21 Connecticut
American Waterways Operators
April 17-20 Washington, DC
Houston Offshore Finance Forum
May 2 Houston, TX

Q2 Maritime Risk

Ad Closing: Apr 15th

Publish: May 2012

Risk runs the gamut from finance to operations, security to safety and prevention and response. This edition also takes on loss control, insurance and regulatory developments. Define, control and mitigate your maritime risk within the pages of this edition of Maritime Professional magazine.

Bonus Distribution:

Posidonia
June 4-8 Athens, GR
Marine Money Week
June 19-21 New York, NY

Q3 Classification Societies, Quality & Design

Ad Closing: July 15th

Publish: August 2012

MarPro zeroes in on naval architecture standards, machinery, engines, ship hull forms and maintenance issues. Classification society personnel define and audit quality and influence design, regulatory and shipbuilding standards. Find out how, why and when each will impact your bottom line.

Bonus Distribution:

SMM
Sept 4-7 Hamburg, DE
American Waterways Operators
Oct 10-12 Seattle, WA
SNAME
Oct 24-26 Providence, RI

Q4 The Environment: Stewardship & Compliance

Ad Closing: Oct 15th

Publish: November 2012

Corporate Stewardship means going green for the right reasons. This issue also examines and analyzes Regulatory Compliance, Planning & Prevention and Salvage & Response.

Bonus Distribution:

Int'l Workboat Show
Dec 5-7 New Orleans, LA

SOFTWARE

Feeding the ERP Beast

ERP systems are beasts. To be happy, they have to be well fed.

by Patrick Dean Roberts

Computer Aided Design/Drafting (CAD) systems are a source of the food for Enterprise Resource Planning (ERP) systems since they contain significant information regarding the plans and materials needed to construct a ship. ERP systems are data hungry. They can only be effective at planning purchasing and production as long as the beast is consuming the information that the CAD system provides.

In fact, there is a direct link between the success of an ERP system and how well it is fed the information it requires to do its job. Unfortunately, too often the process of feeding ERP is handled via manual data entry which is time consuming, frustrating and prone to error. On the other hand, even with an automatic or semi-automatic method for transferring data, the transmission is often done poorly because the right data is not transferred in the right fashion in the right level of detail. Key considerations include how and if a specific piece of data should be translated for its new environment and what level of data should be transferred in order to ensure that sufficient data is available to the ERP system without introducing the unwanted complexity that can result from transferring too much data in an unstructured fashion.

MANAGING & INTEGRATING TECHNOLOGY

Technology, in and of itself, is rarely a significant hurdle. Modern ERP systems have more than enough capability to integrate with CAD programs. In reality, the most important factor for successfully integrating CAD with ERP is having a clear, documented understanding of the business processes that the ERP system is intended to support. In other words, you have to know what the beast likes to eat and what it needs to keep it happy and healthy so it doesn't come back and bite its owner.

With this understanding in mind, the US subsidiary of ShipConstructor Software Inc. (SSI) worked with six leading shipyards to create a repeatable process-focused approach for integrating its Autodesk based ShipConstructor CAD system with various ERP programs. The strategy involved analyzing all of the shipyards' inputs and outputs and the information flows within their larger business processes.

SSI's integration method was proven to work well because it was successfully utilized at shipyards of varying sizes using different ERP systems. The shipyards involved included Austal USA, Inc., Vigor Shipyards, Huntington Ingalls Industries, VT Halter Marine, Inc., Marinette Marine Corp, and Bollinger Shipyards, Inc. who collectively utilize four different ERP systems: IFS; AVEVA MARS; Infor BAAN and Oracle e-Business. Here's the integration plan SSI followed:

1. *Map the activities and information flow within each organization;*

2. *Map existing data elements across various systems to create a data alignment map;*

3. *Define a neutral schema that could be used to transfer data between CAD and ERP systems that supported the Data Alignment Map.*

Let's look at these steps in detail.

BUSINESS PROCESS MAPPING

First, SSI had to map each shipyard's business process at both a macro and micro level. The documentation had to be able to be understood by shipyard workers but also useful to those working with IT systems. SSI selected the IDEF0 function modeling methodology because it is equally well suited to both domains. It offers a functional modeling language for the analysis, development, reengineering, and integration of information systems, business processes, or software engineering analysis. An IDEF0 analysis also shows data flow, system control, and the functional flow of lifecycle processes.

SSI reviewed each shipyard taking into account all departments, existing IT systems, facilities, tools, and both automated and manual processes. To ensure that each of the required stakeholders was engaged in the process, SSI held several lunch-and learn sessions at each organization to highlight the project methodology and the value of the exercise to the organization. SSI made sure to include all key stakeholders in each of the process modeling sessions which allowed them to see a higher level view of their part in their company's overall operations.

To use the beast metaphor again, SSI talked to numerous individuals at each company to understand exactly what information the ERP beast consumed and how it consumed it. This was necessary from a technical perspective but there were other benefits as well. By including people at various levels in each organization it increased their sense of ownership in the project and was a key reason for the project's success.

An additional benefit of documenting processes so thoroughly was that as SSI helped walk people through each step of the IDEF0 model, redundancies and shortcomings of their business processes became apparent. With all the key stakeholders inside the room, SSI was able to help the companies create "To-BE" process changes to streamline and improve their organizations.

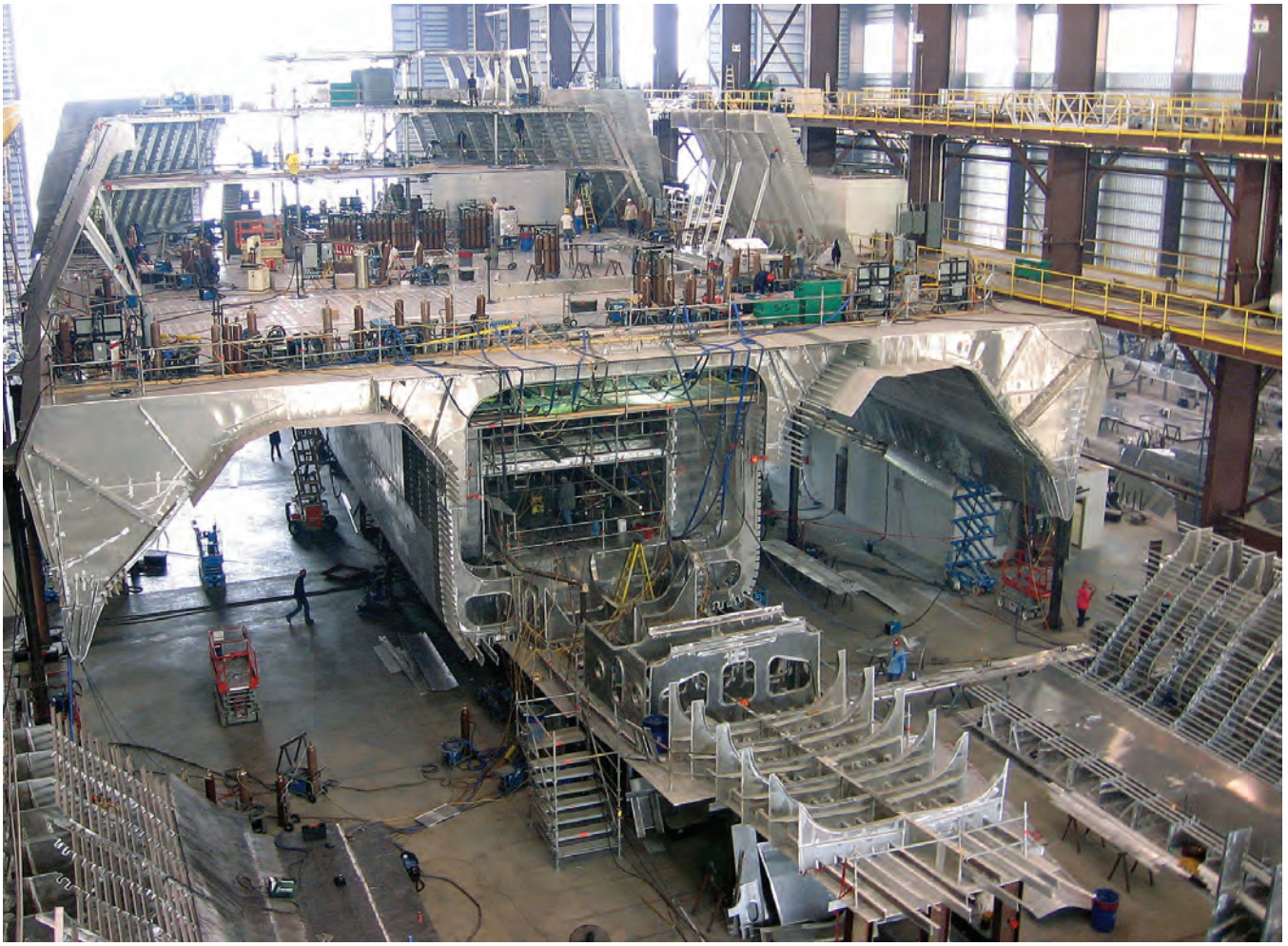


Photo: Austal USA

Integrating ShipConstructor with ERP systems helps manage materials for production.

DATA ALIGNMENT MAP

The next step was creating a data alignment map aligning the specific data fields that existed in ShipConstructor's manufacturing bill of materials (mBOM) and those in each of the ERP systems. The mapping was discovered naturally during the IDEF0 process mapping through the identification of inputs, outputs, controls and mechanisms for each activity. By considering the alignment map generated from multiple shipyards using the same ERP systems, SSI was also able to create a consolidated best-practice map for each ERP system.

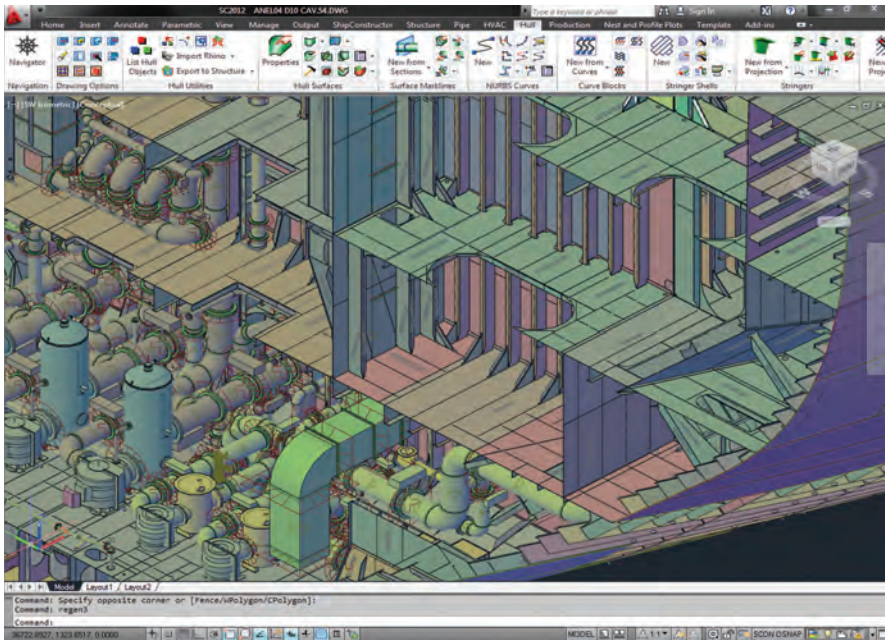
An important factor to note was that SSI deliberately did not align certain data fields even if there was a match in both the CAD and ERP systems. Doing so is a mistake typically made in failed integration projects. SSI realized that it was important to only align the data that was necessary to be shared, as defined by the IDEF0 process documentation.

DESIGNING A NEUTRAL SCHEMA

After the data alignment maps had been created, SSI had to create a single neutral data exchange format that allowed integration with multiple different ERP systems and allowed flexibility for changes in the future. In order to allow the same toolset to be utilized by each of the participating shipyards, it was determined that a neutral format schema would be required. This was to allow the various ERP systems in use to capture the data and to ensure that the same data set would satisfy the data alignment map for each yard.

SSI submitted to the yards a specification following best practices for the storage and classification of data. The document format leveraged existing standards based descriptions of complex textual data, eXtensible Markup Language (XML), and its associated schema definitions (XML Schema).

It was noted that a neutral data exchange format was superior to a proprietary data transfer method in that it allowed for greater interoperability with other legacy systems. The schema rules also provided the flexibility for shipyards to extend the data format to suit future requirements since it provided a means to define custom data objects and information logically within the frame-



(Image Courtesy: ShipConstructor)

SHIPCONSTRUCTOR SOFTWARE INC.

ShipConstructor CAD software Screenshot

work of the data exchange format. As these shipyards are of varying size, complexity, and capability, and utilize a variety of ERP systems, the resulting schema is believed to be representative of the shipbuilding industry as a whole.

CREATING THE TOOLSET

The final stage of the project was for SSI to develop a few simple tools within the ShipConstructor environment that would generate XML according to the schema developed earlier. As ShipConstructor drawings are automatically generated from the 3D model in DWG form and driven by the Build Strategy for the project, it made sense to drive XML generation from within a ShipConstructor production drawing. Another reason to create the tools within ShipConstructor itself is that the timing for the generation of the XML is logically tied to the creation or approval of a new revision of a given drawing and this is an activity driven from within the drawing for these clients. For this reason, SSI created a set of commands that can be run inside the ShipConstructor/AutoCAD environment.

In other words, SSI modified ShipConstructor software so that with a few mouse clicks inside of a production drawing, the metaphorical food for ERP is cooked and served on a platter, ready for the beast to consume.

RESULTS

To date, the shipyards have implemented the resulting tools to different degrees. Those who have implemented it to a significant degree have noticed immediate improvements including:

1. *A reduction in scheduling delays due to a tighter integration between material planning and engineering work packages.*

2. *Increased throughput due to improved Just In Time material handling*

3. *Business improvements identified via the process mapping exercise*

A REPEATABLE PROCESS

The philosophy that SSI has followed in utilizing the IDEF0 methodology for documenting business's processes and then creating a proper data alignment map and a neutral exchange format can be applied to various other integration projects including the integration of PLM systems and other applications used by shipbuilders.

ERP systems may be a beast but SSI has found a way to keep the beasts happy. The key is feeding them well.

The Author

Patrick Dean Roberts is Director of Operations at ShipConstructor Software USA, Inc., in charge of al US-based sales, support, training, consulting, custom integration and development, and various research and development projects focused on the US market. Roberts served a two year term as the Vice Chairman of Ship Production Process Technologies in the United States National Shipbuilding Research Program (NSRP) that is governed by 12 Executive Members of a consortium elected shipyard organization and is currently serving in his second two year term as the NSRP Vice Chairman of the Business Process Technologies Panel. He has ten years of US shipbuilding, repair, and retrofit experience in the areas of engineering, planning, project management, and research and development, as well as 4 years as an executive manager with ShipConstructor Software USA, Inc.

Technical

Towards the Integrated Shipyard

by Stéphane Neuvéglise

Today's shipbuilding industry relies on the technical capabilities and productivity of a wide range of engineering and design software tools. But technology developers like AVEVA are now increasingly focusing their efforts as much on the integration of these tools as on their individual capabilities. Recent additions and enhancements to the AVEVA Marine solution clearly show this and highlight the inexorable trend towards greater integration, both in data and in the working methods that the software supports.

There are two aspects to information integration: integrating the data used in engineering and design, and integrating the much wider variety of information used across an entire enterprise. Both are related of course, and AVEVA has powerful technologies that address both. First, it is important to explain Integrated Engineering & Design (IE&D).

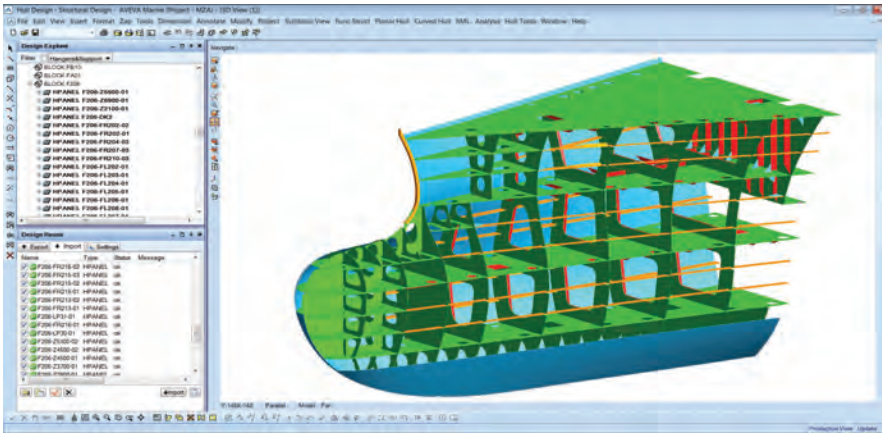
INTEGRATED ENGINEERING & DESIGN (IE&D)

AVEVA Marine has been from the outset, technology integration, formed from a powerful best-in-class shipbuilding solution and its counterpart for the plant industries. As a result, most of AVEVA's applications now serve both industries and AVEVA Marine provides many valuable functionalities not previously available to shipbuilders; for example AVEVA Global, which supports robust multi-site project collaboration. The foresight in this groundbreaking integration is now clear to see, as new projects such as FLNG are conceived which combine plant and marine disciplines into a single complex design.

Turning to the latest AVEVA Marine releases – the 12.1 product series – we see valuable across-the-board enhancements in information sharing. Extended language support and upgraded data sharing functions now make globally-distributed projects even easier to integrate and manage. An enhanced report generating tool is not only easier to use, it enables reporting across a much wider range of engineering and design data. And a standard model library makes it easier to reuse common design elements.

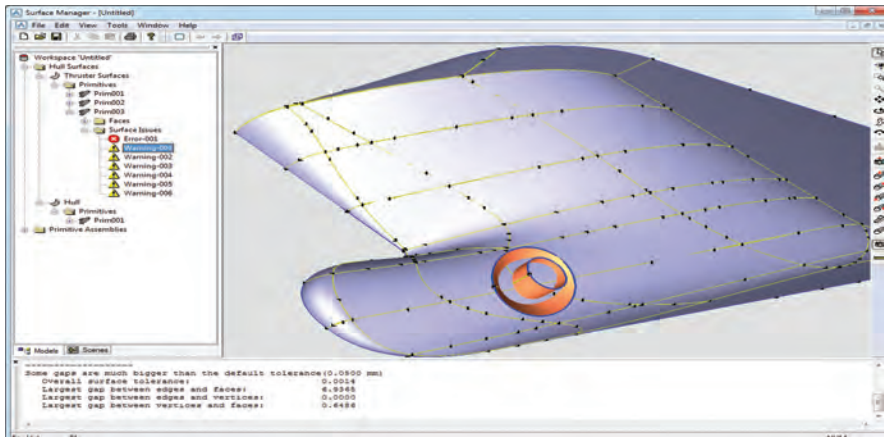
Integration of schematic engineering data into the common project database has now been greatly enhanced, making it accessible by all disciplines, including 3D design, while retaining control by the originating discipline. Interestingly, schematic system design can now be carried in the context of the vessel's general arrangement, a powerful aid to productivity on complex, densely-packed designs such as warships, as a system designer can position items in their approximate physical location at the outset.

AVEVA Marine already includes applications for integrating work processes with third-party applications, for example efficiently converting hull structure into an optimal mesh for finite-element analysis, or importing 3D models of equipment items from a vendor's 3D CAD system. To these we have added AVEVA Surface Manager, which enables efficient import or export of surface definitions, supporting a wide choice of specialist surface design tools and the controlled export of defined areas of the hull form to subcontractors, protecting a design bureau's intellectual property. This is more than just an interface though; it is 'intelligent', enabling errors or surface inaccuracies to be corrected during import and surfaces to be defined in the most efficient manner to ensure the best



(Photo: Aveva)

A typical hull module selected using AVEVA Design Reuse. The copied module can be freely edited for its new purpose while retaining full associativity between its parts.



(Photo: Aveva)

The new AVEVA Surface Manager application can import data from third-party surface design programs.

result while working with the rest of the AVEVA Marine suite.

Another new product, AVEVA Engineering, adds further data integration. This application enables a wide variety of schematic and tabular data to be created in, or imported into, a common database from where it can be robustly controlled and shared across a project. Historically, every engineering company has created data in a variety of spreadsheets, databases and schematic CAD systems, none of which were integrated. Data was therefore frequently duplicated, with the inevitable inconsistencies, and impossible to control or share effectively. Now such fragmented but valuable information can be properly integrated, have any inconsistencies highlighted for correction, and be shared across the various disciplines that require it.

Perhaps the most eagerly awaited new product is AVEVA Design Reuse. This is much more than just a 'Save As' function; it enables all or parts of previous projects to be replicated for use on subsequent ones by also copying the 'intelligence' in the originals. The potential savings in design effort can be as high as 70%, whether for sister ship designs, or for creating new ships from modular design elements. Importantly, Design Reuse does more than simply replicate hull structure; it can replicate outfitting, equipment and drawing information. The retained intelligence between the various design elements enables the new version to be resized or re-proportioned as necessary. Different catalogues and standards may also be applied to the new design to meet specific client requirements.

DESIGN INTELLIGENCE

On the subject of design intelligence, the new AVEVA Space Management application makes extensive use of the ability to associate different types of information. Every hull structure is a form of 'egg box' of different volumes forming the various rooms, compartments, holds and so on. Manually creating these subdivisions, adding their various attributes (such as SOLAS classification, insulation specification, paint requirements and so on) and then updating everything as the design evolves can be laborious and error-prone. AVEVA Space Management overcomes this by automatically creating an initial subdivision of a hull into volumes and then allowing these divisions to be interactively resized, merged, split or redefined as necessary.

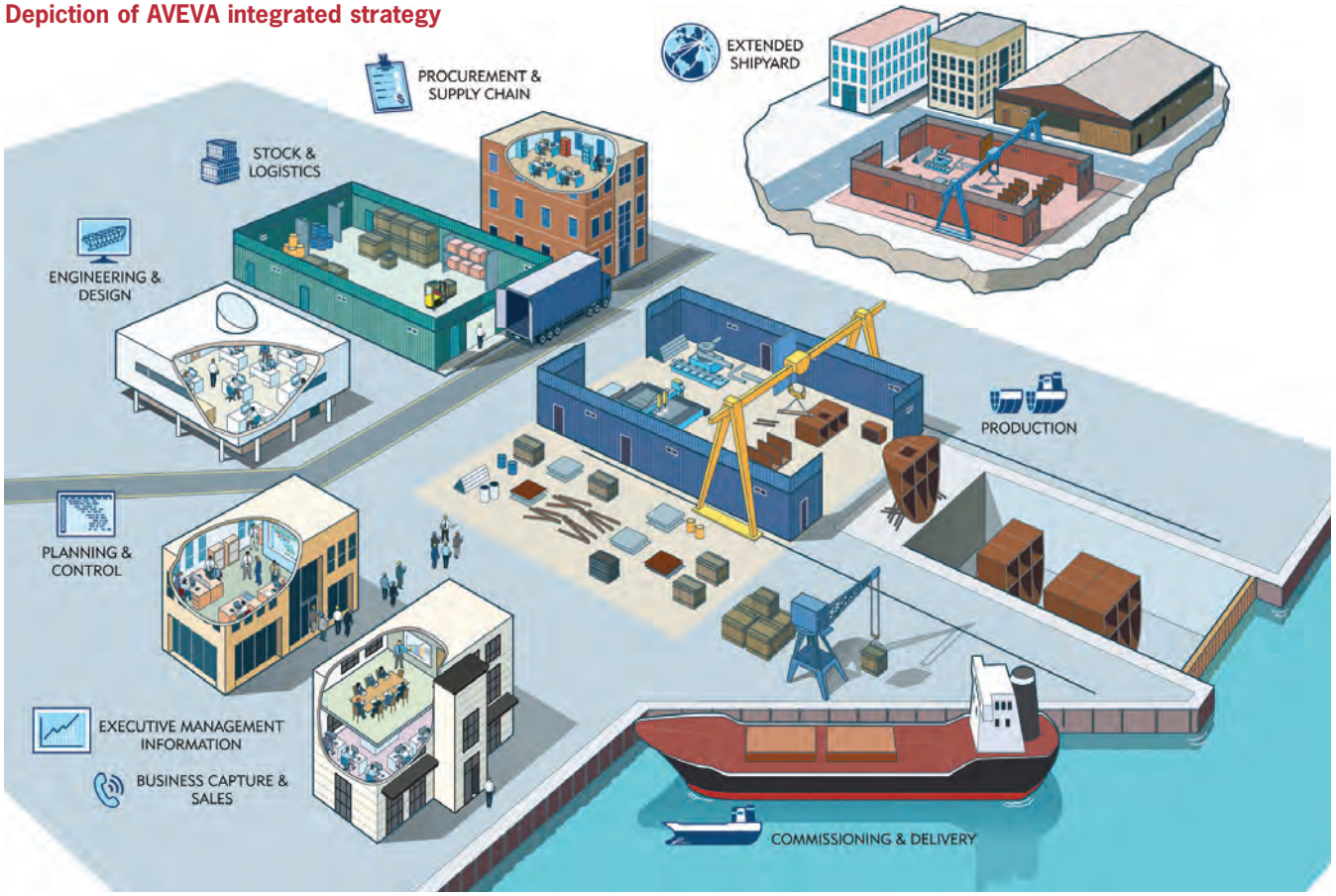
The software automatically updates the dependent attributes so that, for example, the total Bill of Materials for insulation or carpeting remains in step with the design.

The advantages gained from integrating marine and plant design solutions are plain enough. Another new product will shortly be added to AVEVA Marine that brings further productivity to outfitting designers: AVEVA Pipe Supports – Marine. The precursor of this, AVEVA Multi-Discipline Supports, has for many years been considered the proverbial 'killer application' in the plant design world, dramatically reducing the labor required to design and specify the huge numbers of different supports and hangers required. But this product is overkill for marine outfitting so, rather than create a separate marine 'lite' version however, AVEVA has effectively implemented the 'lite' version as a particular view of the full product. This offers the outfitting designer easy access to the more limited range of supports typically used in shipbuilding, but retains access to the full functionality if necessary. So, a marine outfitting designer and a plant piping designer will actually use the same product, but configured optimally to their individual needs.

ECONOMY: TIME SAVED = COMPETITIVE ADVANTAGE

The kind of business benefits that arise through the combination of more product capability and more extensive information sharing are considerable. Customers regularly report saving hundreds of man-hours per ship purely through the use of new or upgraded applications. Add to this the more general efficiency improvements that arise through better use and sharing of data, and the ability to tender for more complex, collaborative projects, and it is clear that integrating engineering with

Depiction of AVEVA integrated strategy



(Photo: Aveva)

design and extending the scope of this integration offers considerable competitive advantage.

The holy grail of data integration is the concept of information being created once, using the most appropriate authoring tool, and made readily available to all users while retaining control with the responsible discipline. This ideal situation may never be achievable in practice – new technologies will continually emerge – and there is still some way to go in integrating currently used forms of data, but the goal is clear and progress towards it has already delivered substantial productivity gains. Just as the productivity of CAD software consigned the drawing board to history, so today's integrated applications are superseding stand-alone applications with restrictive proprietary data formats. These new technologies drive down costs and timescales not only by being more productive, but also by putting accurate and complete information in the right place at the right time, in forms which make it easy to use.

An apt analogy is the team of skilled football players who are each locked in a cage, unable to pass the ball or to play as a team. Remove the cages and you transform the game. The question is not so much 'which type of team are you?' as 'which type of team are your competitors?'

Surrounding the engineering and design disciplines are many business processes which also benefit from information integration. This is a subject in its own right that I would like to explore in a future article, but the message is clear: the integrated shipyard is not just wishful thinking. The technologies that enable it are here now and are transforming productivity.

www.aveva.com/marine

The Author

Stéphane Neuvéglise is Head of Business Management Systems – Marine, AVEVA. He is responsible for AVEVA Marine product strategy and marketing. Stéphane joined AVEVA in 2005, following a successful career in shipbuilding. He first worked for 14 years for a major cruise-ship builder, where he held various positions, focusing on FEM calculation and CAD/CAM, becoming HVAC Contract Manager and finally Head of the Coordination Design Office. Directly before joining AVEVA he spent two years as the head of a ship design agent, providing design services for navy shipyards.

Stats

In a Class by Themselves

Comparing classification societies has never been an apples-to-apples exercise and this edition's **BY THE NUMBERS** depiction is no different. The chart below shows < approximate > numbers and tonnage for various metrics, supplied primarily by the organizations themselves. Where data is missing, it was not made available. These are nominally the world's largest classification societies and all are members of the International Association of Classification Societies (IACS), which maintains a set of rules and prerequisites for inclusion and Common Structural Rules for various marine structures. According to IACS, the purpose of a Classification Society is to provide classification and statutory services and assistance to the maritime industry and regulatory bodies as regards maritime safety and pollution prevention, based on the accumulation of maritime knowledge and technology. To that extent, all of these groups fulfill that role very well. That said, IACS also says, "…Classification Societies are not guarantors of safety of life or property at sea or the seaworthiness of a vessel because the Classification Society has no control over how a vessel is operated and maintained in between the periodical surveys which it conducts." In other words, the task of maintaining a safe world merchant fleet rests in the hands of a myriad of stakeholders; shipowners, charterers, flag states, port state control, the IMO, the mariners themselves and a dozen other variables. All parties would do well to remember this good advice.

Category	ABS	BV	ClassNK	DNV	GL	LR	RINA	World Fleet
Fleet (millions GRT)	180.6	84.6	190.6	154.1	100.2	162.7	32.8	1035
Fleet total (vessels)	11191	11640	7596	6074	7910	6435	4275	115990
Passenger	20	538		382	197	396	1077	2139
Offshore	1168	174		1007		431		5379
Misc. (other)	3000+	5280	1291	1269	4203	2506	2476	8077
Container	526	310	608	242	2077	439		5004
RO/RO	104		304	271		108		2143
Bulker	828	858	2811	640	270	971	264	9199
Gas	122	244	304			233	5	
Tanker	1459	1015	1367	1658	484	1351	453	13587
Flags (top 3 - GRT)		Panama	Panama	Liberia	Ant. / Barb.	Liberia	Italy	Panama
		Malta	Japan	Bahamas	Germany	Panama	Panama	Liberia
		Liberia	Liberia	RMI	Liberia	RMI	Malta	RMI
Growth (5 yrs - GRT)	33%	56%	31%	36%	56%	18%	64%	
Order Book (GRT)	54.3	14.4	36.1	36.6	25.1	36.9	2.2	255.5
Order Book (Vessels)	1011	843	972	850	671	1059	148	8117
PCT of global market	19.4%	6.8%	71.0%	17.2%	12.0%	17.3%	1.0%	
	ABS	**BV**	**ClassNK**	**DNV**	**GL**	**LR**	**RINA**	**World Fleet**

Each classification society – regardless of its size – has measurable strengths. Germanischer Lloyd, for example, claims more than 40% of the world's containerships and a whopping 48% of all containerships on order. Lloyd's Register boasts a Passenger Ship Support Center in the United States and has a 43% global market share in cruise ships. The American Bureau of Shipping arguably has the fattest order book, also maintaining a leading role in offshore exploration and production sectors. ABS fleet numbers also include almost 4,000 tugs and barges. Meanwhile, ClassNK's fleet recently surged past 190 million GT, maintaining the society's global lead in that regard. In terms of growth, however, the smaller classification societies, in particular Bureau Veritas and RINA, continue to experience explosive growth over the past five years. Det Norske Veritas takes pride in what it characterizes as a leading role in green shipping, having helped develop the first prototype LNG fueled ferry and rules for "Gas Fueled Engine Installation". The technology has evolved into 23 vessels, 17 on order and 2 conversions for short sea shipping, 95% of which are classed to DNV. **All in a Class by Themselves. Indeed.**

D

Directory

Classification Societies

ABS

From its foundation in 1862, promoting maritime safety has been the core commitment of the American Bureau of Shipping (ABS). Today, we strive to be the most efficient provider of marine and offshore classification services. We are achieving that goal through the innovative thinking, enthusiasm and professionalism of our staff.

Tel: 1-281-877-5800
www.eagle.org
ns-info@abs-ns.com

Bureau Veritas

Created in 1828, BV is a leader in conformity assessment and certification services. BV helps clients to improve their performances by offering servicesand innovative solutions in order to ensure that their products,infrastructures and processes meet standards and regulations in terms of quality, health and safety, environmental protection and socialresponsibility.

Tel: +33 1 55 24 70 00
www.bureauveritas.com

CCS

Founded in 1956, China Classification Society (CCS) is the only specialized organization of China to provide classification services. The objective of CCS is to abide by the national constitution, laws, regulations and policies and conform to the social moral practices, and to provide services for the shipping, shipbuilding, offshore exploitation and related manufacturing industries as well as marine insurance

www.ccs.org.cn/en/index.htm
webmaster@ccs.org.cn

DNV

DNV (Det Norske Veritas) is an independent foundation with the purpose of safeguarding life, property, and the environment. Its history goes back to 1864, when the foundation was established in Norway to inspect and evaluate the technical condition of Norwegian merchant vessels.

Tel: +47 67 57 99 00
http://www.dnv.com

GL Group

GL Germanischer Lloyd facilitates a great number of standards and joint industry and research projects each year. GL develops new tools, methodologies, standards and recommended practices to solve technical questions while reinforcing high safety and quality standards.

Tel: +49 40 36149-4509
www.gl-group.com

Korean Register

The Korean Register of Shipping (KR) is a classification society founded in Korea offering verification and certification services for ships and marine structures in terms of design, construction and maintenance. Founded in 1960, the society employs 560 people.

Tel: +82 042 869 9114
www.krs.co.kr/eng/index.html

Lloyd's Register Group

Safety has been at the heart of our work since 1760 and we invest our time, money and resources to fulfill Lloyd's Register's mission: to protect life and property and advance transportation and engineering education and research. The Lloyd's Register Group is one of the world leaders in assessing business processes and products to internationally recognized standards.

Tel: +1 (1)281 675 3100
www.lr.org/default.aspx
Email: americas@lr.org

ClassNK

Nippon Kaiji Kyokai, known as ClassNK or NK, is a ship classification society. The Society is actively engaged in a growing range of ship related activities and services aimed at contributing to promoting the protection of human life and property at sea as well as protection of the marine environment.

Tel: +81-3-3230-1201
www.classnk.or.jp
E-mail: bnd@classnk.or.jp

The RINA Group

RINA S.p.A. is a company created by Registro Italiano Navale, a private body founded in Genova in 1861 by a number of economic concerns involved in the maritime transport sector. RINA is one of the founding members of IACS (International Association of Classification Societies) and actively participates in technical, research and rule-making groups in different institutional contexts at national and international level.

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19	Delgado	fireschool@dcc.edu	(504) 671-6620
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1	Gulf Copper	www.gulfcopper.com/rig.htm	(281) 599-8200
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35	International Registries, Inc.	www.register-iri.com	(703) 620-4880
35	ISO Bunkers LLC	www.isoindustries.com	(757) 855-0900
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29	Johnstone Finacial Advisors	www.johnstonefinancial.com	(866) 989-2929
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25	Ship Constructor	www.shipconstructor.com/mp	Please visit us online
7	Ship Equip Inc	www.ship-equip.com	(281) 690-5600
17	Sound Propeller Systems, LLC.	www.soundpropellersystems.com	(206) 291-2748
19	The Mariner Group LLC	www.commandbridge.com	Please visit us online
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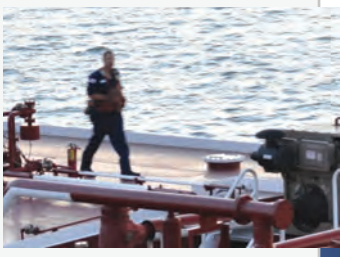

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Submit nominations through the website, or contact the editor:

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