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Marine Safety Engineering

A Note From The Director

Greetings! Welcome to the latest edition of the Marine Safety Engineering Newsletter. In this edition, we highlight the complexity piece of the Prevention triple-challenge outlined in the Coast Guard Prevention Long-Term Strategy. Specifically, we look at the constantly evolving maritime sector and how we stay up to date with industry's incorporation and utilization of more sophisticated technologies.

Water-borne transport of goods and materials that are vital to the U.S. economy has always been a complex task. The recent focus on sustainability and greener shipping has resulted in owners and operators developing more intricate designs to meet shareholder and customer transportation requirements. This translates into smarter, more efficient designs both for vessels and marine engineering systems that rely increasingly on cyber elements as well as novel energy sources. Although there are multiple facets of the Marine Safety Engineering (MSE) program that are developing regulations to meet this surge in maritime complexity, the simple fact is that the technology is here now and we need to respond accordingly. We are meeting this demand with advanced training for our marine inspectors through industry training and shiprider programs, as well as forging and developing partnerships with industry stakeholders to promote open communication and knowledge sharing on the complexities inherent in the maritime industry.

In this issue, we emphasize the work of some of our engineers at various levels of the organization, and show how they are responding to the growing complexity of the maritime transportation system. Similarly, we show the evolution of cadet designs at the Coast Guard Academy to illustrate the response in academia to increasingly complex ships and engineering systems. Finally, we look at the hard work that Coast Guard members from the Office of Design and Engineering Standards, the Marine Safety Center and various field units, large and small, perform daily to stay current with the demands of a complex industry.

Finally, I welcome the new personnel that arrived this past transfer season and I wish those who recently departed the best of luck in their new assignments and endeavors. Individual contributions may sometimes feel overlooked in the moment but are part of the critical large picture of facilitating safe, efficient, and environmentally friendly maritime transportation. I personally thank all of you for the complex work you do each and every day, and remind you that your dedication does not go unnoticed.

Jeff Lantz,
Director of Commercial Regulations and Standards

Congratulations to the Following Graduates of the MSE Advanced Education Program:

Chemical Engineering - HAZMAT
LT Jake Lobb

LT Ariana Mohnke

Electrical Power Systems & Controls Engineering
LT William Williams

Fire Protection Engineering
LT Alexandra Miller

Marine Engineering
LT Jacob Baldassini

LT Kelly Berry

LT Patrick Brown

LT Kathryn Williams

LT Cameron Cooper

LT Lauren Gainor

LT Anthony Garofalo

LT Ian Oviatt

LT Leigh Sowers

Mechanical Engineering
LT Amanda Hamlet

Marine Safety Engineering Program Manager:

LT Patrick Brown

Liquefied Natural Gas (LNG) Bunkering Operations

By CDR Marc Montemerlo, MS in Reliability Engineering

Jacksonville is historically known as the "First Coast" because it is believed to be the first part of Florida to be colonized by Europeans. Now, this title can be used to symbolize a new era of "firsts." Over the last two years, Jacksonville has gained recognition for its many accomplishments in helping to facilitate the Energy Renaissance in the United States, specifically, small-scale Liquefied Natural Gas (LNG) bunkering operations.

With the current operation of the two TOTE Services LNG-fueled container vessels (M/V ISLA BELLA and M/V PERLA DEL CARIBE), and the addition of the two Crowley Maritime commitment class ConRo vessels this fall (M/V EL COQUI and M/V TANIO), local shipping companies have partnered with LNG producers and suppliers to develop innovative bunkering solutions for their ships. The majority of these unique concepts have been purpose-built vessels and facilities that are not yet covered by the existing regulations. Using a risk-based approach, Sector Jacksonville has been able to work with each vessel and facility operator on an individual basis. This collaboration has led to regulatory compliance schemes that allow the use of novel technology, but more importantly, ensure the safety of all involved parties and the surrounding port areas. By participating in various risk assessments, Sector Jacksonville has been able to address unique hazards specific to the local environment, geographic location, and port operations. These risk assessment studies have helped to develop mitigation strategies that meet the intent of the applicable regulations or provide an equivalent level of safety.

SIMOPS allows for simultaneous cargo and bunkering operations, drastically reducing turnaround time.

Of particular interest has been the fact that Sector Jacksonville has allowed LNG bunkering operations to take place simultaneously with cargo operations, commonly known throughout the industry as Simultaneous Operations (SIMOPS). By being proactive and working with all of the involved parties early in the developmental stage of each operation, Sector Jacksonville was able to fully evaluate the risks associated with combining shipboard and facility operations with LNG bunkering. Additionally, corrections to each system could be made through the use of tabletop exercises, and full-scale equipment deployments prior to the first bunkering evolution.

As the energy renaissance continues, Sector Jacksonville's risk-based approach to regulatory oversight will ensure compliance with the intent of the existing regulations while also allowing for unique and innovative solutions. And, with the expansion of LNG operations and the possible addition of an LNG export facility, Sector Jacksonville is well positioned to keep pace with this burgeoning industry, and serve as a model for other ports throughout the United States.

Welcome Back!

During this transfer season, the Marine Safety Center and the Office of Design and Engineering Standards welcomed back four Marine Safety Engineers.

Marine Safety Center

LCDR Jodi Min
Machinery Branch Chief

Office of Design and Engineering Standards

CDR Michael Simbulan
Chief, Human Element & Ship Design Division

CDR John Miller
Chief, Systems Engineering Division

CDR Marc Montemerlo
Chief, Hazardous Materials Division

Civilian Spotlight: Mr. Raymond Martin

By LT Chris Rabalais, MS in Mechanical Engineering

Ray Martin is a civilian electrical engineer in the Office of Design and Engineering Standards. With over 30 years of experience evaluating and participating in the development of standards for mechanical and electrical systems, he is one of the senior staff engineers in CG-ENG. Ray graduated in 1984 from the U.S. Coast Guard Academy with a bachelor's degree in marine engineering. Following an initial student engineering tour, he began his career in marine safety at one of the first marine inspection training ports, Marine Inspection Office (MIO) New York.

As a Coast Guard Marine Safety Engineer, Ray has been involved in a broad range of topics. He plays a key role in the evaluation of international standards and their incorporation into U.S. regulations and policies. For example, he recently revised U.S. commercial ship navigation equipment standards to align them with more stringent international standards. He also provides technical guidance for the development of new domestic regulations, such as enhanced electrical equipment standards for offshore vessels and facilities that were prompted by the Deepwater Horizon incident.

When asked what he has enjoyed the most about his career as a Marine Safety Engineer, Ray says "One of the best things about being a Coast Guard Marine Safety Engineer is working with an extremely diverse and talented pool of engineering and industry representatives. Additionally, the Coast Guard marine technical offices and inspection departments have diverse staffs from a variety of commissioning sources, experience levels, as well as enlisted ratings. Their continued energy and enthusiasm for protecting lives, property, and the environment have made for a rewarding career as a Coast Guard Marine Safety Engineer."

MSC Global Impact - Initial Control Verification Exam Process

By LT John Di Nino, MS in Naval Architecture & Marine Engineering, and Industrial Operations Engineering

HARMONY OF THE SEAS
Photo courtesy of Royal Caribbean International

I return to my hotel room after the latest concept review meeting between the Coast Guard and the designers of a new cruise ship destined for the shores of the United States. Sitting down at the small desk by my window, I review the major ideas presented to the Marine Safety Center (MSC) team. I reach for my bag, pulling out a freshly bound document titled "Final Design Analysis," which details the engineering analysis used to demonstrate the safety level of new design features that do not meet existing international standards. It documents years of work the vessel designers have done with the vessel's Flag State and Classification Society to demonstrate how the newest innovations in the cruise industry will impress passengers while protecting them from harm.

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In Memoriam...

We remember ADM William Kime, 19th Commandant of the Coast Guard, and ADM Robert Kramek, 20th Commandant of the Coast Guard. Both were ardent proponents of the Marine Safety mission, laying the groundwork for many crucial maritime regulations that are enforced today. Their legacies truly stand the test of time and their devotion to duty and maritime safety is beyond reproach.

ADM J. William Kime
19th Commandant of the Coast Guard
15 Jul 1934 - 14 Sep 2006

ADM John William Kime served as the 19th Commandant of the Coast Guard from 1990 to 1994. His primary focus was to strengthen the maritime safety and environmental protection activities of the Coast Guard and his career to that point emphasized his expertise in those fields. During his tenure, he led the Coast Guard's implementation of the Oil Pollution Act of 1990 and reinforced the Coast Guard's efforts to prevent and respond to oil and chemical spills. He graduated from the Coast Guard Academy in 1957, second in his class, and from the Massachusetts Institute of Technology with a master's degree in naval architecture and marine engineering and a professional degree in naval engineering.

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MSC Global Impact - Initial Control Verification Exam Process (cont.)

By LT John Di Nino, MS in Naval Architecture & Marine Engineering, and Industrial Operations Engineering

I'm here in Italy because my assignment as a naval architect at the MSC affords me the opportunity to work on some of the most cutting-edge cruise ship design projects in the world. This means that I often get to travel to witness construction of these vessels in the world's most advanced shipyards and meet incredibly talented and innovative engineering staffs.

The greatest impact I have as a naval architect is during the Initial Control Verification Examination for foreign passenger vessels, where I evaluate alternative (performance-based) designs which deviate from the regulations. As an engineer, my greatest challenge is ensuring the assumptions made during the design phase are maintained to ensure the final design provides an equivalent level of safety for the thousands of passengers onboard.

Initial Control Verification Exam Team (from left to right) LT Yusen Guo, ACTEUR; LT Jason Hill, MSC; LT John Di Nino, MSC

As the day comes to a close, I look up to stare out the window overlooking the Italian coastline. To the right, two new cruise ships rise from their docks as hulking bodies of steel. I think back to our recent plan review of the largest passenger ship in the world (over 226,000 GT) and the largest capacity passenger ship accommodating nearly 12,000 persons. With passenger entertainment features such as amusement parks, multi-deck shopping malls, and expansive sports complexes, these novel vessels never could have been imagined by the original writers of the regulations. That is why the alternative design process is so crucial as it allows designers to use the underlying assumptions and intent of the regulations to design a vessel that achieves an equivalent level of safety.

As an engineer, I am energized by the diverse challenges that lay ahead of me. It truly is an exciting time to be a naval architect and I look forward to what new challenges this constantly evolving maritime sector may bring me in the future.

In Memoriam (cont.)

He was the first Coast Guard officer to serve as the president of the Society of Naval Architects and Marine Engineers (SNAME) in 1992. Also noteworthy is that ADM Kime was promoted from rear admiral to admiral never having held the rank of vice admiral.

ADM Robert E. Kramek
20th Commandant of the Coast Guard

15 Dec 1939 - 20 Oct 2016

ADM Kramek served as the 20th Commandant of the Coast Guard from 1994 to 1998. He significantly expanded the Coast Guard's global reach and influence in a variety of missions, one of which being vessel inspections and compliance. ADM Kramek was instrumental in developing and approving the Alternate Compliance Program (ACP) in collaboration with the American Bureau of Shipping (ABS). The ACP is intended to increase the competitiveness of the U.S. maritime industry by streamlining the inspection services conducted by the Coast Guard and ABS, which greatly reduces the regulatory burden for many vessels. Through his leadership, duplication of inspection tasks was minimized; a move that created greater flexibility for industry while allowing the Coast Guard to focus resources on vessels which pose a greater risk.

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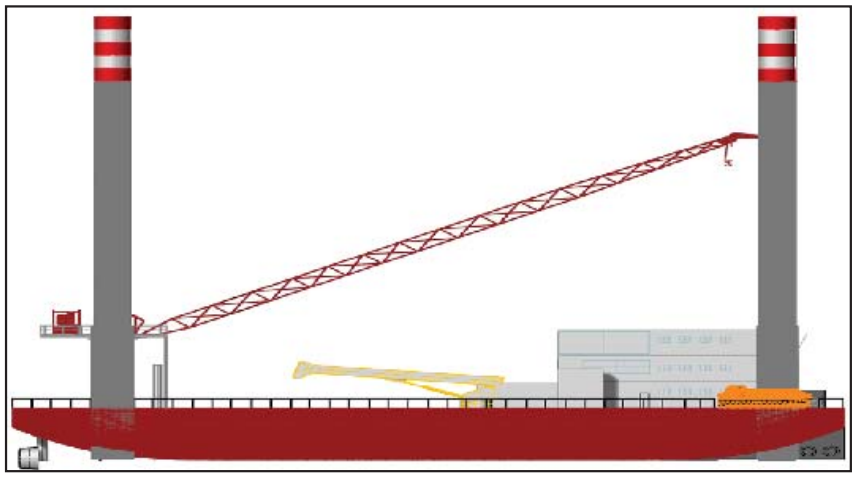
Complexity in Senior Design Projects at the U.S. Coast Guard Academy

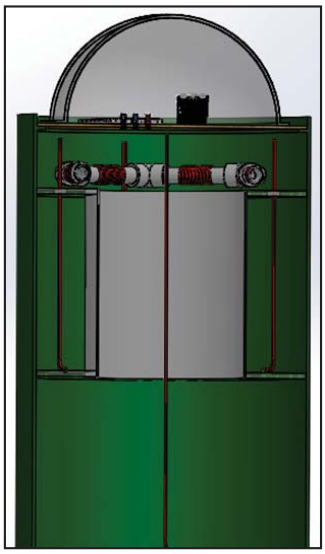
By CDR Joshua Pennington, MS in Fire Protection Engineering

The advancement of maritime technology relentlessly marches forward and as Marine Safety Engineers we have the distinct opportunity of working at the leading edge of that advancement. This often requires significant dedication, research, and self-learning to attain a level of knowledge on par with our design engineer counterparts. To our credit, MSEs have put in the hard work and earned a solid reputation for maintaining engineering competency and keeping pace with technology. Similarly, Coast Guard Academy cadets have gone beyond traditional classroom lessons to become proficient in the latest maritime technologies. This is clearly evident in the evolution and complexity of their senior capstone projects.

Today's naval architecture & marine engineering student project designs reflect the modern design challenges of multi-system integration and green fuels. Examples of this year's work include two variations of an inland tender: one with a diesel-electric powertrain and a second with a diesel-hydraulic powertrain with hydraulic azimuth thrusters. Additionally, naval architecture students tackled an LNG fueled lift boat – no easy task for any engineer!



The growing complexity in vessel design and green fuels is manifested in this cadet rendering of an LNG-fueled lift boat.



Cadet rendering of "smart" buoy that detects corrosion

In addition to designing and fabricating mechanical systems, mechanical engineering students now write code for open source programmable logic controllers (PLC) to build "smart" control systems for their projects. This year one team designed a corrosion-detection system for buoys that featured a wave motion-based power generation system inside the buoy, with integrated GPS and solid-state PLC sensors to measure temperature, pressure, and humidity. The system is designed to send automated corrosion-alert text messages, but is also "push" capable so a user may actively request on-site weather conditions and verify buoy position.

As advancements in technology continue, it is assuring to know that Coast Guard Academy cadets and aspiring engineers are not afraid to get their hands dirty and will be ready to meet the challenges brought about by novel designs and emerging technologies.

Bravo Zulu to the graduating Academy engineers!

In Memoriam (cont.)

He graduated with honors from the U.S. Coast Guard Academy in 1961 with a degree in engineering. Also, he received a master's degree in naval architecture, mechanical engineering, and engineering management. He served as president of ABS Americas from 1998 to 2004, president and COO of ABS from 2004 to 2006, and as president of SNAME in 2007.

Complexity in the Coast Guard's Largest District

By CDR Brian Khey, District Eight Outer Continental Shelf Division

Ask anyone who has been assigned to the Eigth Coast Guard District (D8), including the new District Commander RADM Thomas, and they will tell you it's a "challenging" environment. So what exactly is it that makes D8 so challenging? Is it the highly trafficked ports, the busy Vessel Traffic Systems (VTS), the high volume of marine inspections and marine investigations, or the large number of facilities? Is it the fact that the D8 Area of Responsibility (AOR) covers 26 states? The answer is NO. D8 is truly challenging because of the diversity in the maritime industry, and the challenges that come with managing that diversity.

Despite an evolving and highly complex offshore domain, D8 is also responsible for the safe transport of inland vessels and their diverse cargoes

D8 is made up of three distinct areas: inland, coastal and offshore. Each area provides its own unique challenges that one must fully grasp in order to ensure maritime safety. The inland area houses 10,300 miles of river covering 22 states. It links the nation's heartland to the world and moves over 880 million tons of cargo annually. The Army Corps of Engineers manages 27 aging locks in the Upper Mississippi River system that are critical to commerce. Once down into the Lower Mississippi River system, vessels tow up to 36 barges, moving over 100,000 tons of cargo in a single transit. The river system itself is dynamic and presents varying conditions during high water and low water events.

The coastal area is the confluence of the inland and offshore areas and serves as the gateway to the world, and includes seven of the top ten busiest U.S. ports. This interface merges the inland fleet with the deep draft fleet, which presents challenging waterway management issues. In addition, hurricanes pose significant threats to D8's long stretches of port areas, making planning and preparedness critical every season.

The offshore area houses over 1,700 production structures and, because of this staggering number, both Mobile Offshore Drilling Units (MODUs) and Offshore Supply Vessels (OSVs) work nonstop to support them and the U.S. oil and gas industry as a whole. Every year, as technology improves and the oil and gas industry finds ways to push exploration farther offshore, we in D8 are met with an evolving challenge.

It truly is a difficult task to safeguard these three separate and unique areas. Whether it's ensuring the safe delivery of millions of tons of cargo, managing vessel traffic with two very different fleets, or protecting the environment and the thousands of offshore workers spanning outwards of 200 nm from shore, the challenges are seemingly endless. However, we adapt to the changing environment and rise to the challenge every day.

And that's just Prevention...

From HQ to a Feeder Port

By LT Brian Hall, MS in Fire Protection Engineering

I recently had the exciting opportunity to transfer from the Office of Design and Engineering Standards to the Inspections Division at Sector Boston. Having been out of the field for four years, it was amazing to see the many changes made in Prevention and to readjust to the complex missions taken on by inspectors every day. Boston has a wide variety of vessels and facilities, from yacht club launches to LNG import facilities, and everything in between. This has provided a unique opportunity for me to witness a broad spectrum of the maritime domain and to see the many advancements in technology and compliance that come with it.

Boston is home to a variety of vessel types including the LNG tanker BERGE BOSTON.

There is a great reliance today on electronic systems, including electronic charts and security systems. As inspectors we must understand how the system is used, how updates happen, and what questions to ask the crew to ensure that they understand how to use the system. Software updates, version control, IT requirements, and backup systems all become crucial when utilizing the efficiency of an electronic system.

The use of classification societies and third parties by the industry continues to grow, and impacts the role of the marine inspector. In addition to understanding vessel equipment and systems, inspectors must also understand operations, maintenance procedures, and management frameworks in order to ask the right questions of third parties. Additionally we must be proficient in overseeing third parties at both a corporate and deck plate level to ensure compliance. I recently attended an ISO9001 auditor course covering auditing and managing quality systems. As we rely on safety management systems (SMS) and the potential for towing SMS (TSMS) in the future, it is important to comprehend how a quality management system should operate.

Finally, the threat of cyber security continues to concern industry partners. Some entities have large corporate structures that are able to make great strides in creating a “hard” cyber target; other entities do not have the same expertise and resources. Every linkage becomes a potential weakness and benign projects such as the linkage of port cameras onto a network for use by harbor masters, can introduce additional system vulnerabilities. This seemingly innocent effort to increase port security could have potentially undesirable effects and illustrates the importance of maritime personnel that understand the need for highly complex cybernetics systems.

All of these sweeping changes taking place in the maritime domain require additional and different inspections expertise. And, while shifts toward audit schemes have the potential to reduce inspection time, they in no way reduce the scope or complexity of training necessary to oversee safety on more advanced vessels. Every opportunity must be harnessed to broaden the knowledge base and prepare for the growing proficiency required by a seasoned inspector.

If you have any comments about this e-newsletter, or would like to contribute an article to an upcoming edition, please contact LT Paul Folino:

msenewsletter@uscg.mil
(202) 372-1361