

Marine Safety Engineering

A Note From The Director

Greetings! Welcome to the November 2014 edition of the Marine Safety Engineering (MSE) Newsletter. Admiral Thomas (CG-5P) and I were recently reflecting on our careers as Marine Safety Engineers and the myriad of talented professionals with whom we have had the opportunity to work. This edition of the newsletter is a celebration of the accomplishments of a few of those professionals and a reflection on the significant progress that has been made in the last 7 years to ensure that our civilian and military engineers are experienced, highly trained, and responsive to innovation and technological developments.

In 2007, responding to concerns about a decreased emphasis on marine safety, we began a concerted effort to improve the quality and experience of our inspectors and engineers. This effort included increased training and opportunities for our military workforce, along with a focus on the retention of our highly skilled civilian workforce who provide continuity and serve as a great repository of corporate knowledge.

We have enhanced and expanded our training program in a number of ways: engaging cadets at the Coast Guard Academy, utilizing post-graduate education, and facilitating opportunities to gain valuable industry experience through ship riding and industry training. We have come a long way in increasing the effectiveness of these programs and the results are paying dividends for the Coast Guard and our partnership with industry professionals. Our marine safety engineers are poised to respond to such key emerging issues as liquefied natural gas (LNG) as fuel, marine safety in the arctic, and the increasing shift towards performance-based design.

I offer my hearty congratulations to Captain John Nadeau, CO of the Marine Safety Center (MSC), who was recently selected to become a flag officer. Captain Nadeau has a strong background in marine safety engineering and his selection highlights the continuing priority of the Coast Guard to ensure marine safety experience and leadership resides within the highest levels of the service. I also extend my deep appreciation to Mr. Randy Eberly, of the Life Saving and Fire Safety Division, who retired in October after 28 years of federal service, and to Mr. Kurt Heinz, the Chief of the Life Saving and Fire Safety Division, who will retire at the end of the year after 35 years of service to the Coast Guard.

My sincere thanks go out to everyone for their hard work over the past year. I wish everyone an enjoyable holiday season and hope that you find plenty of time to spend with family and friends.

Regards,



Jeff Lantz,

Director of Commercial Regulations and Standards



Welcome Aboard! New Hires in CG-ENG

By LT Andrew Murphy, Master's Degree in Chemical Engineering

Every summer CG units experience significant turnover, and this summer was no exception for the Office of Design and Engineering Standards (CG-ENG). Three civilian positions were filled with the arrival of Ms. Dawn Gray, Mr. Chris McKenna, and Mr. Tom Gleave.



Mr. McKenna, Ms. Gray and Mr. Gleave.

Ms. Gray joins the Human Element and Ship Design Division (CG-ENG-1), where she is the senior human factors engineering psychologist. Her responsibilities include managing human element considerations in regulation, policy, and standards development as well as overseeing the Crew Endurance Management Systems (CEMS) program. Nearly 80% of marine accidents involve human error, making her expertise a vital addition to the CG-ENG team. Her vast experience working for government agencies in the human elements field includes positions with the Coast Guard's Human Systems Integration Division (CG-1B3), the U.S. Navy, the U.S. Army Research Institute, and the Canadian Forces Materiel Group. This experience makes Ms. Gray an incredible asset as the CG-ENG-1 team continues to tackle new human element issues.

Both Mr. McKenna and Mr. Gleave join the Hazardous Materials Division (CG-ENG-5), providing subject matter expertise as well as overseeing policy and regulatory development for Hazardous Materials. Mr. McKenna specializes in bulk liquids and gases, while Mr. Gleave specializes in bulk solids and packaged hazardous materials. With the current energy boom in the United States driving huge changes in domestic oil transportation, Mr. McKenna's 14 years of experience working in the refining industry in Philadelphia provides a unique perspective to the CG-ENG-5 team that will be invaluable to achieving the balance between safety and facilitation of commerce. Prior to joining the Coast Guard, Mr. McKenna worked for the EPA developing programs to reduce air pollution from various transportation modes. Mr. Gleave also previously worked for the EPA, specializing in air quality, as well as holding positions with NASA and the Department of the Interior. Mr. Gleave and Mr. McKenna join the CG-ENG team during an important shift, as marine operators grapple with new low-sulphur requirements for fuel. Their knowledge and experience with air emissions will be a valuable asset during this transition. Furthermore, Mr. Gleave's experience as a regulator over the past 15 years will be vital as the Coast Guard and international community create regulations for previously unregulated bulk solid cargo residues.

With a growing list of important regulatory projects and issues to tackle, the CG-ENG team welcomes Mr. McKenna, Mr. Gleave, and Ms. Gray and looks forward to their contributions to the safety of the U.S. maritime community.

Non-Intrusive Load Monitoring for Ships' Electrical Systems

By LTJG Will Cotta, Mechanical / Ocean Engineering Graduate Student

Increasing the efficiency of an electrical system requires a full understanding of how the system works. Typically, a ship's electrical loads are not fully monitored due to the high cost of sensors and wiring throughout the ship. Non-Intrusive Load Monitoring offers the potential to monitor an entire ship's machinery status using only one set of sensors on the main distribution panels. Every electrical load from a laptop charger to a large induction motor has a uniquely identifiable electrical signature when it turns on and off. By sampling current and voltage at high

Non-Intrusive Load Monitoring for Ships' Electrical Systems (cont.)

frequencies (8 kHz), and using probabilistic modeling, these unique electrical signatures can be found and tracked.



LTJG Will Cotta checks a power monitor.

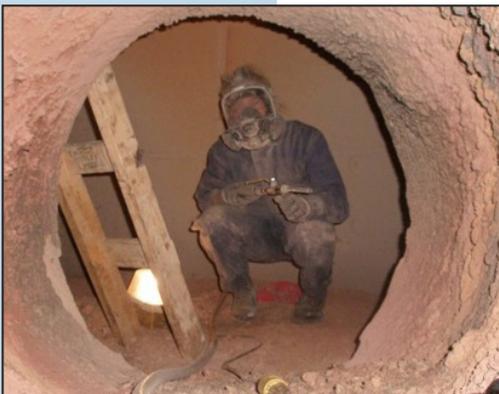
Actionable information can be obtained from the current and voltage data through signal processing techniques and electrical transient detection algorithms. Valuable information pulled from the processed current and voltage data includes: appliance level consumption for energy monitoring, human activity monitoring, and condition-based maintenance. Watchstanders and computer automation systems can use this information to improve efficiency by reducing electrical consumption, optimizing online generator capacity, or diagnosing faults that would otherwise be unnoticeable to maintenance personnel.

Non-Intrusive Load Monitoring has previously been installed on Coast Guard 270's and successfully detected faults in vacuum sewage systems well before the system degraded to the point of being inoperable. For the past year I have been working with the U.S. Army and MIT's Research Laboratory for Electronics to increase the accuracy of the machinery detection algorithms, and continue to refine the ways in which the current and voltage data can be processed and utilized.

Work done with the Army and MIT on real world experiments at Army facilities resulted in the successful identification of methods to decrease energy consumption at Forward Operating Bases by up to 15% and detection of numerous machinery failures.

Cadets Get Underway with Commercial Vessels – CGA's Cadet Shiprider Program

By Cadet Mary Hazen, Naval Architecture / Marine Engineering Student



1/C Mary Hazen is preparing to blow down the boiler on the M/V HORZION KODIAK.

This summer I had the opportunity to act as a crewmember on two commercial vessels as part of the CGA's cadet Shiprider Program. I learned that partnerships between the Coast Guard and the maritime industry play a key role in shipping, and are essential not only to the people and businesses depending on those goods, but also to the U.S. economy.

I started the program in New Orleans at the main office of the Canal Barge Company (CBC), learning about the business aspect of the company. I also met with Rear Admiral Cook, the Eighth District Commander, and discussed the importance of the Shiprider Program to my development as a Coast Guard officer.

Afterward, I boarded the towboat LAINY JONES for a weeklong adventure up the Mississippi River. I stood duty in the pilothouse, the engine room, on deck working the tows, and I even tried my hand at cooking! The crew was outstanding, going out of their way to help me understand and experience their life underway.

Congratulations to the Following Post-Graduate

Selectees for AY 2015

Chemical Engineering - HAZMAT

LT Jake Lobb
LT Ariana Mohnke

Electrical Power Systems & Controls Engineering

LTJG William Williams

Fire Protection Engineering

LT Alexandra Miller

Marine Engineering

LT Patrick Brown
LT Kelly Prouhet
LT Jacob Baldassini
LT Cameron Cooper
LT Anthony Garofalo
LT Ian Oviatt
LTJG Kathryn Cappetta
LTJG Lauren Gainor
ENS Leigh Sowers

Mechanical Engineering

LTJG Amanda Hamlet

Marine Safety Engineering Program Manager:

LCDR Jennifer Doherty

Cadets Get Underway with Commercial Vessels – CGA's Cadet Shiprider Program (cont.)

I departed the LAINEY JONES in St. Louis, MO, for Sector Puget Sound's Prevention Department in Seattle, WA. During my two weeks there, I attended two bulk carrier port state control exams. The discussions with the mariners during these exams prepared me for my three week ship ride with Horizon Line's containership HORIZON KODIAK, as I sailed between Tacoma, WA and Anchorage, AK. The crew and Mr. Danny Ellis, Superintendent of Horizon Lines, were outstanding and further emphasized the importance of building professional relationships.

Perhaps my greatest takeaway was the value of my engineering education at CGA. On the LAINEY JONES, I was able to comprehend the impact on the vessel's stability during refueling operations. On the HORIZON KODIAK, I donned my PPE and took the engineers up on the opportunity to clean the boiler! Though I've had several classes with boiler theory, being inside a boiler and seeing the individual components really drove it home.

When I applied to the Shiprider Program I expected to learn about commercial shipping; what I received was a fantastic experience that developed my passion for a Prevention career.

Farewell to an FPE: Randy Eberly

By LT Brian Hall, Master's Degree in Fire Protection Engineering

Randy Eberly began working at Coast Guard headquarters in 1973 in what was then called the Merchant Marine Technical Division. During his early time at headquarters, he worked on numerous projects and was part of the Marine Board of Investigation for the fires on both the ANGELINA LAURO and the BAY STATE.

In 1982, he took a job with the Nuclear Regulatory Commission and 2 years later began working as a consultant for private industry. In 1998, Mr. Eberly returned to headquarters and quickly began to work on a highlight project of his career, the 2000 SOLAS amendments and the Fire Safety Systems Code. In 2010, following the tragic fire and sinking of the DEEPWATER HORIZON oil rig, Mr. Eberly was once again called upon to participate in the Marine Board of Investigation.

During his long tenure with the Coast Guard, Mr. Eberly has seen our technical focus evolve; from Subchapter K boats and casino vessels in the late 1990s, to our current focus on offshore supply vessels, platforms, and other vessels operating on the outer continental shelf. Regardless of the technical focus, the Coast Guard's priority of working for the safety of people and the good of mankind has been a major motivator for Mr. Eberly throughout his Coast Guard career.

When pressed for some words of wisdom, Mr. Eberly had two very important points to make: first, don't try to solve a problem with just what's in front of you. You have to take the time to look through the historical documentation and find out why and how people arrived at the decision. Secondly, take time to sit down with people instead of simply e-mailing or instant messaging. Face to face communication helps you to get to know people, encourages open dialogue on issues you didn't even realize were connected, and enables you to build professional relationships that will pay future dividends.

Randy Eberly is retiring to Bowie, MD, where he lives with his wife Noreen.



**Mr. Randy Eberly at his
retirement ceremony.**

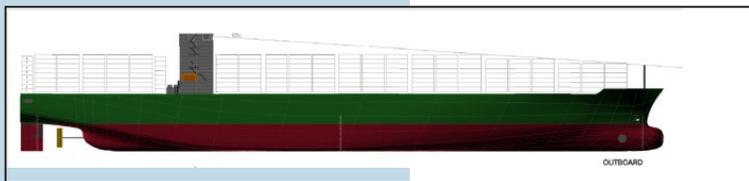
CGA Naval Architects Take Home 2012-2014 SNAME/MARAD Student Design Competition Awards

By LCDR Dan Cost, Master's Degree in NAME & Mechanical Engineering

Each year seniors in the Naval Architecture & Marine Engineering major at the Coast Guard Academy complete a ship based capstone design project with half of the class working on the design of a military vessel and the other half working on the design of a commercial vessel. The commercial design teams from the CGA Class of 2014 focused on the design of a containership capable of operating between Shanghai and New York through the widened Panama Canal. In addition, the teams were tasked with developing a vessel that was compliant with the North American Emission Control Area requirements.

The cadets presented their designs to a distinguished group of marine safety experts from industry and the Coast Guard at Sector New York and the Marine Safety Center and submitted their designs as part of the 2012-2014 SNAME/MARAD Design Competition.

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Dual-Fuel Panamax Containership.

Engineer in the Spotlight: LT Bryson Jacobs

By LT J. B. Zorn, Master's Degree in Systems Engineering

Implementation of the North American Emission Control Area has led to the emergence of Liquefied Natural Gas (LNG) as a viable alternative marine fuel for short sea shipping. To meet growing demand for engineering knowledge in this field, the Coast Guard has developed a cadre of technical experts to develop safety standards and to review and approve proposals for use of LNG fuel systems. A myriad of applications are in progress or have been proposed, including LNG-fueled Offshore Supply Vessels, containerships and passenger vessels, as well as LNG bunker barges. LT Bryson Jacobs, a post-graduate fire protection engineer entering his fourth year at the Marine Safety Center (MSC), is leading the charge as one of a handful of elite Coast Guard subject matter experts on shipboard LNG propulsion systems.

Among many other projects, Bryson is MSC's lead engineer for the world's first LNG-fueled containership. His strong technical background has been critical to MSC's engineering evaluation of complex LNG systems for which no regulatory standards exist. Applying recently published Coast Guard policies, his contributions on this project alone include the detailed technical review of over 300 engineering submittals, 400 system drawings, and exchange of over 700 pieces of correspondence among involved parties. Given the unique properties of LNG, this type of plan review is non-routine, requiring these systems to be evaluated from initial concept through final design. MSC places particular emphasis on the design of LNG storage tanks, cryogenic piping, and specific CG-Type Approval of high-velocity Pressure/Vacuum valves in the containment system.



LT Robertson and LT Jacobs oversee an LNG tank under construction.

To build on their knowledge base and to exchange ideas with field commands and industry regarding the safe use of LNG as a marine fuel, LT Jacobs and fellow MSC engineer, LT Zach Robertson, recently took their show on the road. Their outreach was in areas where LNG fueled vessel designers, builders and equipment manufacturers are based. They visited shipyards, Coast Guard field units, and cryogenic manufacturing facilities on the Gulf Coast and Western Rivers, making stops at liquefaction, peak shaving, and LNG vehicle refueling facilities along the way. Meetings among Coast Guard and marine industry members left all stakeholders with a better understanding of the state of LNG in America, and a greater appreciation for the concerns of their counterparts.

LT Jacobs' outstanding work in this field led to his nomination for the Coast Guard Engineer of the Year Award. His article, "Greening the Fleet: The Marine Industry Considers LNG as a Marine Fuel" was also published in the Proceedings of the Marine Safety & Security Council, Vol. 70, No. 4. He is excited to continue to advance his engineering knowledge and share his expertise during his remaining time at the MSC, and in his forthcoming tour as a Marine Inspector.

CGA Naval Architects Take Home 2012-2014 SNAME/MARAD Student Design Competition Awards (cont.)

1st Place (\$3,000) Team Argo:
Michael Caballero, John Hamel, David Carrier and Lena Ludewig

10,000 TEU Dual-Fueled New-Panamax Containership capable of operating on LNG



Members of Team Argo accept 1st place award at the 2014 SNAME Conference.

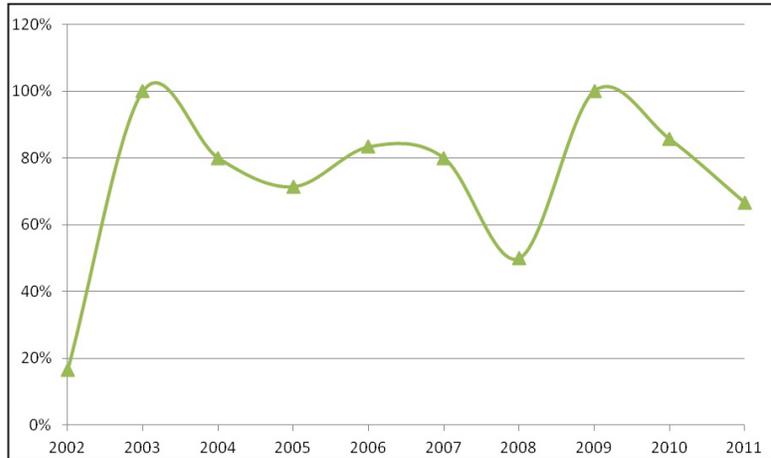
3rd Place Team Bacon Waves:
Nick Capuzzi, Brandon Foy, Carter Schlank and Ainsley Stringfield

12,350 TEU Green Class Containership with a Wet Exhaust Scrubber system

Marine Safety Engineers and Their Return on Investment

By CDR Pete Gooding, Master's Degree in Naval Architecture / Marine Engineering

Times are busy for the Marine Safety Engineering program, with the 11 newly-selected MSE's starting their graduate school program this summer and the graduate school panel recently selecting the next 14 future MSEs. With MSEs making up the largest group of graduate school students, it is natural to wonder how the Coast Guard is getting their return on this investment.



Percent MSE retention based on graduate school graduation year.

Each new MSE has a payback tour, but what happens after that payback tour is just as important, because we have more senior positions that rely on these MSEs. After completing an initial MSE payback tour, the Prevention program has historically retained over 70% of the MSEs within the program. The other 30% either transfer to other programs (Response, CG-4, Intel, etc.), separate, or retire. With an OAP-16 (Operations Ashore Prevention – Marine Safety Engineering) workforce pyramid that has 2 Captain, 7 Commander, and 38 Junior Officer coded billets, this requires us to have a minimum ratio of 1 senior officer for every 4 junior officer billets. The healthy 70% retention rate allows us to meet this need and the needs of the individuals to do special assignments, senior service school, or other important Coast Guard tours.

Another important aspect when considering the Coast Guard's return on this investment is the performance at advancement boards. I recently looked at how the MSEs have performed at the past two selection panels, Promotion Year (PY) 14 and 15. In PY14, the MSE community had 7 in zone (not counting above zone or retiring) for O-6, 5 for O-5, and 10 for O-4. Collectively, 82% were selected for promotion, with 6 members being selected for O-6. In PY15, the MSE community had 8 in zone for O-6, 4 in zone for O-5, and 2 in zone for O-4. For those members, the MSE community had a very high 86% selection rate, considering that the average board opportunity for selection was 61%. And, finally, in both PY14 and PY 15, a flag officer was selected from the MSE community. Between the steady retention of MSEs and the MSE's strong performance at promotion boards, the Coast Guard continues to get an excellent return from sending prevention officers to engineering graduate school.

The Unprecedented Opportunities of CGA's Marine Safety Training Program

By LCDR Josh Pennington, Master's Degree in Fire Protection Engineering



2/C Park Suski conducts a Port State Control Examination.

LCDR Dan Cost and I have the privilege of serving as representatives of the Prevention community and executing the marine safety curriculum at the Coast Guard Academy (CGA). Cadets now have the opportunity to participate in CGA's Marine Safety Training Program (MSTP) over the summer, which provides 1/c, 2/c, 4/c and Academy Introductory Mission (AIM) participants a background and understanding of the Coast Guard's marine safety program and the maritime industry.

This summer our 1/c program offered opportunities to participate in the Cadet Shiprider Program and spend time at a Sector Prevention Department or an internship at the Marine Safety Center (MSC). Two cadets spent two weeks on a Horizon Lines coastal containership, followed by time in the Prevention Department at Sector Puget Sound conducting Port State Control and Domestic Vessel Inspections. We also sent two cadets to sail on a Hornbeck offshore supply vessel (OSV) for two weeks in the Gulf of Mexico supporting offshore drilling operations. These are the first cadets we've placed on an OSV and we are very excited about this new partnership.

Eight 1/c cadets took part in our third-annual offering of towing vessel shiprides. Four American Waterways Operators companies hosted cadets for 1-2 weeks and exposed them to towing vessel operations underway, including considerable time at the helm. Three of these cadets also visited the Towing Vessel National Center of Expertise (TVNCOE) where they received an inland waters orientation that included basic safety training.

Two 1/c cadets competed for, and were awarded, the highly-coveted internship at the MSC where they were exposed to all aspects of commercial ship design plan review while completing independent research projects.

Our one-week 2/c program sent 60 cadets to nearby Sector Prevention Departments where they participated in Port State Control Exams, Domestic Vessel Inspections, casualty investigations and Command Center operations. A special thanks to Sector New York, Sector Boston and Marine Safety Detachment Cape Cod for their support!

Lastly, our reporting 4/c received a 90-minute history and evolution of the Marine Safety missions lecture followed by a tinfoil 'shipbuilding' exercise, while over 540 AIM participants were given a brief introduction to the Coast Guard's Prevention missions.

In contrast to a decade ago, graduating cadets depart CGA with not only awareness of our marine safety missions, but a practical understanding of how Marine Safety Engineering directly supports Sector Prevention and its importance to the commercial maritime industry.



1/C Cadets conduct inspection of Foreign Flag Yacht.

If you have any comments about this e-newsletter, or would like to contribute an article to an upcoming edition, please contact LCDR Jennifer Doherty:

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