

# Marine Safety Engineering

## A Note From The Director

Greetings! Welcome to the Summer 2018 edition of the Marine Safety Engineering Newsletter. I first would like to extend my warmest welcome to the recent graduates of the Marine Safety Engineering program; congratulations, and I look forward to seeing the application of your newfound expertise to the Marine Safety Engineering community.

In this edition, we focus on the versatility of “techies”, which makes them ideal candidates for supporting and leading complex projects. With that in mind, we highlight many of the unique roles Marine Safety Engineers have played in recent, high-profile vessel casualties and major response efforts.

This 2017 hurricane season was one of the worst in recent memory. In addition to the numerous lives lost, these major storm systems resulted in well over \$200 billion worth of damages to the Gulf of Mexico region alone. And in the aftermath of these storms, major ports needed to be assessed and restored, thousands of sunken or stranded vessels needed to be salvaged, and the waterways needed to be re-opened and cleaned up. Events like these are all-hands evolutions, and fortunately there were many Marine Safety Engineers ready to answer the call and provide surge capacity to units and areas directly impacted by these storms. In all, the Marine Safety Center (MSC) and the Office of Design and Engineering Standards (CG-ENG) deployed 13 junior officers to affected regions to provide marine inspection, marine investigation, salvage response, environmental response, and Incident Command System (ICS) expertise.

In this edition, we also highlight the important investigatory work completed by Marine Safety Engineers in the wake of the M/V EL FARO casualty. In addition to direct involvement in the marine investigation, techies from the MSC and CG-ENG continue to support efforts to investigate, understand, and learn from this landmark casualty that will have a major impact on the future of the Prevention program.

As the maritime sector continues to evolve technologically, our Program strengths lie within the abilities of capable, intelligent, and adaptable Marine Safety Engineers, who are continuously called upon to put their training and knowledge to the test in a gamut of special circumstances. I hope you enjoy this edition of the Newsletter.

Regards,



Jeff Lantz  
*Director of Commercial Regulations and Standards*



**Congratulations to the MSE  
Advanced Education Program  
Class of 2020!**

**Chemical Engineering -  
HAZMAT**  
LTJG Ethan Beard

**Electrical Power Systems &  
Controls Engineering**  
LTJG Mason Totri

LTJG Stephen Palmieri

**Fire Protection Engineering**  
LT William Wallen

**Marine Engineering**  
LT Christopher Reimer

LT Carmine Faul

LT Alexandra Fell

LT Joshua Villafane

LT Maxwell Walker

LTJG Tara Larkin

LTJG Jennifer Melendez

LTJG Matthew Zanella

LTJG Yue Shen

LTJG Park Suski

**Mechanical Engineering**  
LT Daniel Velez

**If you are interested in the  
Marine Safety Engineering  
Program, please contact the  
Program Manager!**

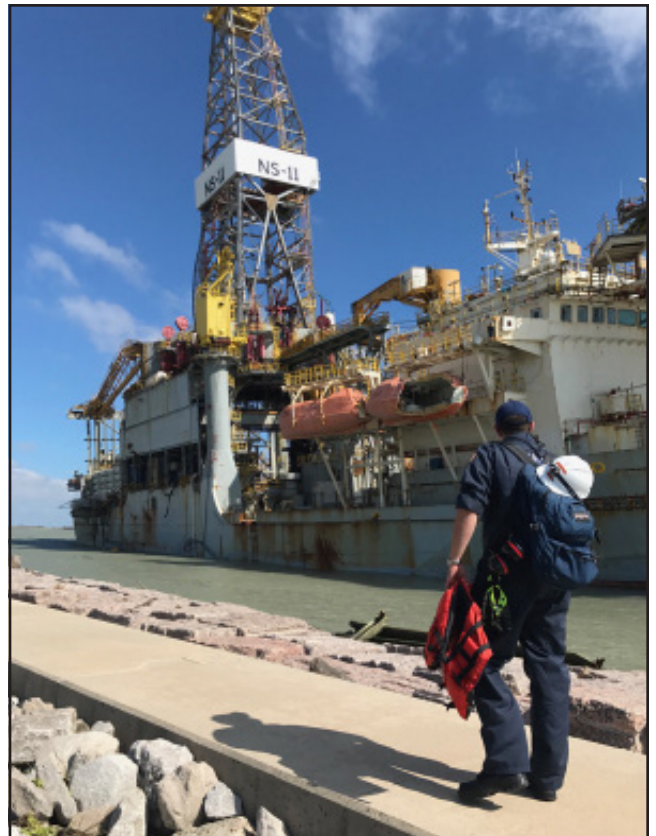
LT Patrick Brown  
(202) 372-1387

## Marine Safety Engineers Add Value and Expertise to Coast Guard’s Hurricane Response

By CDR Suzanne Hemann, Master’s Degree in Fire Protection Engineering

Marine Safety Engineers (MSEs) provide the technical expertise and resources to support local commanders as they work to recover from natural disasters and marine incidents that cripple or threaten our ports and waterways. This year, MSEs from the Coast Guard Marine Safety Center’s esteemed Salvage Engineering Response Team (SERT) were instrumental in protecting public safety and restoring the Marine Transportation System in the wake of the most devastating hurricane season ever recorded in U.S. history. The team of eight Salvage Engineers spent 106 total days on-scene conducting 14 major recovery operations, and provided 1,800 hrs of technical support to Federal On Scene Coordinators throughout Texas, Florida, Puerto Rico, and the U.S. Virgin Islands.

An example of the key support that MSEs offer to the field was the salvage expertise provided to the Unified Command as it worked to remove the 490 foot PARAGON DPDS1 Drill Ship, after she broke free of her moorings and ran aground at the mouth of Arkansas Pass Channel. The wreck held an estimated 10,000 barrels (420,000 gal) of oil, and its location posed an imminent threat to the waterway. This casualty prevented all ship traffic from entering the port for six days, which directly disrupted upwards of \$100 million of commerce per day and tens-of-thousands of port and port-related jobs. SERT member LT Dan Burke deployed to Texas and worked in close partnership with Sector Corpus Christi staff, the contracted salvage company, the Port Authority, and the Pilot’s Association. He evaluated the stability, hull strength, and pollution potential of the drill ship in real-time during the salvage. This information guided decision making and ultimately prevented further damage to the vessel during salvage operations.



**Salvaged vessel being towed to local shipyard in Corpus Christi, TX.**

In addition to naval architecture and marine engineering support, MSEs moved between roles within the command post, providing needed marine inspection expertise and technical skills such as data processing and analysis to facilitate timely risk-based triage and response decision making. CAPT Jason Smith, the Corpus Christi Deputy Sector Commander and a fellow MSE, said recently that “after experiencing this type of event, the best practice we identified is to call in national experts as early as possible.” SERT can be reached 24 hours a day, 7 days a week at (202) 327-3985.

## The EL FARO Marine Board of Investigation and Marine Safety Engineering

By Mr. Jaideep Sirkar, Master's of Science in Naval Architecture & Marine Engineering, CDR Michael Simbulan, Master's of Science in Ocean Engineering, and CDR Suzanne Hemann, Master's of Science in Fire Protection Engineering



EL FARO computer model with a 15 degree starboard list and 5.8 ft of trim by the stern. MSC calculated that hold 3 was flooded to 20 percent.

Casualty investigations are never an easy task, but investigating a casualty where the vessel is miles below the surface of the ocean and there are no surviving crewmembers is a daunting task for even the most experienced investigators. This was the situation facing the Commandant Marine Board of Investigation (MBI) that was tasked with investigating the sinking of the EL FARO and the loss of her 33 crewmembers. While discovery of the Voyage Data Recorder (VDR) for the EL FARO and survey of the wreckage by underwater ROV helped investigators understand some of the incident details, the MBI still had many unanswered questions to address. To develop the full story, the MBI turned to the Marine Safety Engineers at MSC and CG-ENG for their expertise.

The Marine Safety Center provided extensive engineering support to both the NTSB accident investigation and the Coast Guard Marine Board of Investigation. Several of the unit's marine safety engineers and civilian naval architects carried out the project, which involved reviewing more than a thousand documents, questioning multiple witnesses in several public hearings, analyzing numerous engineering plans, and preparing a detailed technical report. This in-depth study, initiated at the request of the MBI and encompassing over 3700 man-hours of technical work was perhaps the most complex and comprehensive forensic engineering analysis of vessel stability and structures ever performed by MSC. Great care was taken to ensure that the underlying facts were fully documented, the assumptions well supported, the engineering analysis unimpeachable, and the resulting recommendations on target. The result was a highly credible report that met all objectives and was delivered on time, aiding investigators in determining the proximate cause.

In addition to the efforts of marine safety engineers at MSC, the dedication of engineers at the Office of Design and Engineering Standards (CG-ENG) provided much needed regulatory expertise in the wake of EL FARO. MSEs from CG-ENG provided detailed testimony during the public hearings of the MBI, which included testimony on the oversight of third parties conducting work on behalf of the Coast Guard, the Alternate Compliance Program, and the background and review of applicable regulations and standards on load lines and stability. Further, the MBI and NTSB held numerous informal meetings involving MSEs from both CG-ENG and MSC to gather background information related to the vessel's machinery, lifesaving arrangements, stability and load lines. The work and collaboration of MSEs in both offices resulted in significant volumes of information that was carefully reviewed, analyzed and synthesized in the context of the whole investigation to produce the final report.

In the first paragraph of the Final Action Memo, the Commandant states, "The loss of the EL FARO and all 33 persons aboard was a tragic and preventable accident... The Coast Guard will take appropriate action on all that we have learned from this investigation". So while the investigation is complete, the work continues and the MSEs in MSC and CG-ENG will help to address many of the safety recommendations in the report.

### [Links for Further Reading:](#)

- [1. Marine Board of Investigation Report](#)
- [2. Final Action Memo](#)

**Congratulations and Welcome to the Following Graduates of the MSE Advanced Education Program:**

**Electrical Power Systems & Controls Engineering**  
LT Boone Swanberg - MSC-2

**Fire Protection Engineering**  
LT Katherine Ahrens – MSC-1

**Marine Engineering**  
LT Kenn Yuen – OCS NCOE

LT Catherine Paris – ENG-1

LT Braden Rostad – ENG-1

LT Scott Arbeiter – MSC-1

LT Brandon Foy – MSC-1

LT Patrick Frain – ENG-1

LT Kim Glore – Cruise Ship NCOE

LT Keith Heine – MSC-3

LT Benjamin McKeathen – MSC-3

LCDR Bradley Peifer – MSC-2

**Mechanical Engineering**  
LT Aaron Garnier – MSC-1

**If you have any comments about this e-newsletter, or would like to contribute an article to an upcoming edition, please contact LT Braden Rostad**

[msnewsletter@uscg.mil](mailto:msnewsletter@uscg.mil)  
(202) 372-1361



## Civilian Spotlight: Mrs. Soheni Haque

By LT William Williams, Masters of Electrical and Computer Engineering, Masters of Business Administration

The Marine Safety Center’s Electrical Engineering Branch has benefitted greatly from the expertise of senior engineer Mrs. Soheni Haque. Soheni has over 25 years experience in electrical engineering, specializing in the offshore and marine industry.



**Mrs. Haque reviewing vessel electrical system plans.**

After graduating with a Bachelors of Electrical Engineering from Bangladesh University of Engineering and Technology, Soheni worked on land based power distribution systems for the Bangladesh Rural Electrification Board. During her tenure, she designed systems to provide power to remote areas of Bangladesh in support of the rapidly developing economy.

From 1996 to 1999 Soheni was an assistant professor of the Bangladesh Institute of Technology. She taught course topics on electrical circuits, power distribution, transmission lines and computer engineering.

She came to the United States in the year 2000 aspiring to work in the oil and gas industry. Soheni graduated from the University of Houston in 2001 with a Master’s of Science in Computer Engineering and began the next steps of her career at the American Bureau of Shipping.

Over the next 16 years, she worked for ABS Americas Offshore Division. While there, Soheni worked extensively on offshore platform projects, conducting full electrical system reviews on hundreds of platform facilities. She is an expert in electrical systems for drill ships, Mobile Offshore Drilling Units (MODUs), floating production platforms (SPARs, TLPs, semi-submersibles), Floating Production, Storage, and Offload Facilities (FPSOs), LNG vessels, and oil containment carriers. She contributed to the electrical requirements for several ABS Rules and Guides. As the Managing Principle Engineer of the Offshore Electrical Department, she managed and led the ABS Americas project work in Propulsion Control, System Automation, and Dynamic Positioning. Her active role and experience was used by both the ABS Technology group and the Chief Engineer’s office to assist development of further guides and proposed class rule changes.

The Marine Safety Center is excited to have Mrs. Soheni Haque here as she continues her valued work and civic service to the maritime community.

## MSC Cadet Internship: Deep-Dive into Autonomy

By: 1/C Wilson Zhou

Hello, my name is Wilson Zhou, a 1/c cadet at the Coast Guard Academy. I'm an Electrical Engineering major and was lucky enough to intern at MSC, researching autonomous ships from an engineering and operational standpoint, and determining how the Coast Guard should regulate these unique vessels. I had the opportunity to travel down to MSD Port Canaveral and learn about the autonomous vessels SpaceX utilizes in their rocket recovery process as a scoping exercise for my research. Accompanied by LCDR Kling and various SpaceX employees, I was given a tour of the drone ship and supervisory vessel used in their rocket recovery operations. They explained their communication and control systems and redundancies for safe operations. I am very grateful for all the experiences and learning moments I've had working at MSC, and look forward to using these skills both in my senior design project and as an officer.

## Space Exploration's Next Big Leaps Depend on Maritime Assets

By LCDR Jason Kling, Master's Degree in Reliability Engineering

Commercial space exploration companies have gained ground in recent years in revolutionizing space technology. Space Exploration Technologies, better known as SpaceX, has taken to the high seas to advance their goals of delivering larger payloads farther into space, and being able to do it more frequently. The key components of progressing toward these goals include the recovery of booster rockets that have traditionally been disposed of in the ocean. In order to recover first stage rocket boosters, SpaceX uses purpose built droneships, which serve as landing platforms for rockets hundreds of miles off the coasts of California and Florida. To effectively and safely monitor unique operations such as these, the Coast Guard enlists the expertise of marine safety engineers from the field, MSC, and Headquarters.



MARMAC 304 with first stage rocket booster onboard.  
Photo courtesy of SpaceX.

The key to a successful landing of a rocket on a ship depends on dynamic positioning, an area in which the marine safety engineering community possesses much institutional knowledge. The MARMAC 303 and MARMAC 304 are remotely controlled vessels with dynamic positioning (DP) system thrusters used for navigating the droneships to the correct heading and position to land rockets approaching the ocean at 560 mph. Since 2015, SpaceX has been attempting rocket landings on the droneships with each mission being a little different. As the company learns more about the capabilities of the rockets and droneships, these highly sophisticated and novel droneships are constantly being modified to optimize performance. Whether it's enhancement of communications links or camera coverage, or increased fire protection, the MARMAC vessels make for a dynamic marine safety engineering project that our engineers need to collaboratively tackle in order to ensure paramount safety.

What's unique to this class of vessels is that while they are towed offshore, once they are at the mission site, they are released and operated remotely from land or stand-by vessel without any crew onboard. Additionally, there is a combination of fire hazards that only exists at rocket launch pads. SpaceX carefully coordinates system designs associated with these risks with the local OCMI and the Marine Safety Center. Additionally, the Office of Design and Engineering Standards provides guidance when SpaceX proposes technology that goes beyond the scope of what the current regulations provide. Collectively, the Marine Safety Engineering community contributes greatly to the challenging mission of supporting space exploration with maritime assets.



1/C Wilson Zhou with LT Eric Doherty at SpaceX facility in Cape Canaveral, FL.