

MARITIME TRAINING FOR EMERGENT OPPORTUNITIES

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INTRODUCTION:

The traditional model for maritime training has been coursework leading toward either a deck or engine credentialed graduate. Given the changing nature of regulation and the introduction of new technologies these lines have become blurred. New positions such as Electro-Technical Officer and Environmental Officer have become standardized over the last decade. Added responsibilities defined within these existing modalities now encompass Safety officer and Safety engineer. This paper will focus upon these positions and the cross training recommended for a deck or engine officer to successfully preform those duties. It will further highlight emerging opportunities.

Environmental Officer

Today's cruise industry represents the strongest growth segment of marine industry employment both aboard and ashore.¹ The position of Environmental Officer is unique to the industry afloat however the responsibilities and training for the job transition well to positions ashore in all maritime segments. The Environmental Officer is the person responsible for the overall environmental compliance, public health and safety on vessels that exceed 8000 passengers and crew, the equivalent of a floating city².

¹ <https://www.cruisemarketwatch.com/capacity/>

² <https://royalcareersatsea.com/pages/environmental>

The knowledge for the position encompasses our traditional training with crossover, particularly for deck students needing emphases in engineering systems. The additional training unique to the position includes- Environmental Management-Environmental Law-Public Health-Marine Pollution-Environmental Hazard Communication. Soft skills needed are public speaking-writing-spreadsheet analysis.

The engineering skill set is particularly important in that the Environmental Officer is legally responsible for vessel emission compliance. That person will sign off that the Oil Water Separator is functioning within MARPOL limits. He will also ensure that air emissions are in compliance, either by monitoring the sulfur content of the fuel *or* the efficiency of the exhaust scrubbers. The Environmental Officer is required to monitor both black and gray water discharges and the functioning of the sewage treatment plant in general. These limits change as a vessel proceeds from MARPOL waters into waters under the jurisdiction of Port State Control or Special Areas as defined by MARPOL. He or she is responsible for the accurate compiling of the garbage record book, monitoring of food discharges and the proper handling of any hazardous or special category waste such as medical waste. The responsibilities of the position also includes the monitoring of all chemical storage areas as well as the proper labeling and hazard communication and training for the crew.

In addition to the aforementioned the Environmental Officer is in charge of environmental training for crewmembers and maintaining records of the training. He or she is responsible for the accurate recording of all records pertaining to the environmental operations of the vessel. This includes:

- Oil Record Book
- Garbage Record Book
- Hazardous Waste Documentation
- Medical Waste Log
- Expired Drug Disposition
- Deck and Engine Logs regarding accuracy of positions
- Monitoring of oily waste discharged ashore
- Monitoring or Implementing a recycling program aboard

The position usually reports to the Master of the vessel with co-reporting to a corporate Vice President for compliance.

Our institution is in the process of taking existing classes both inside and outside ones major to create a certificate program to encompass the required knowledge for the position. Courses recommended are:

- Chemistry
- Ship Systems I (Discusses the environmental systems on the ship)
- Environmental Management
- Environmental Law
- Marine Pollution

These courses as well as a good command of word processing and spreadsheet programs are necessary as well as a comfort level in written and oral communications and public speaking are recommended to comfortably fulfill the role.

Electro-technical Officer:

This position has evolved from the cruise industry into a necessary position on many vessels due to the complex automation fitted. As crew sizes shrink due to automation and engine rooms are virtually unmanned most of the day more ships systems are networked and monitored, even controlled remotely. Indeed in these days of ever increasing levels of automation a thing as simple as a failed network buss can stop a multi-million dollar vessel from operating.

The position is a highly specialized one containing elements of electrical engineering, automated controls, hydraulics, computer networking, network troubleshooting, communication and cyber security. Indeed the 2010 Manila amendments to the STCW code have recognized and codified the training required for the position in regulation III/6 of the code³. A person seeking this position should have demonstrated knowledge of:

- Onboard Computer Networking and security
- Ships propulsion and auxiliary machinery
- Instrumentation and control systems
- High-voltage power systems
- Integrated navigational equipment
- Radio electronics

He or she will be responsible for the efficient operation as well as maintenance and troubleshooting of these and any other integrated systems. The position usually reports to the Chief engineer. On highly complex vessels such as cruise ships, research vessels and drill ships there may be a junior and senior Electro-technical positions onboard.

Many institutions have made the Electro-technical officer training as an add on to the training required for an operational level engineer position. Given the rapid evolution of vessels the position will be in high demand going forward and will likely supplant a watch standing engineer billet.

Safety Officer/Engineer

It is required that every ship appoints a named ships officer or engineer as Safety Officer to handle safety issues related to the ship and the crew⁴. The safety officer should act as the safety advisor on board ships and ensures that all requirements related to health and safety is met. On cruise ships these duties are met by a stand-alone position often working in conjunction with the Environmental Officer.

The ships safety officer makes recommendations to the master on health and safety matters. It is the duty of the safety officer to lookout for potential hazards and

³ Electro-technical Officer is an officer qualified in accordance with the provisions of regulation III/6 of the [STCW Convention](#)

⁴ STCW A-II/1, A-III/1,AIII/6

means of preventing incidents on board ship. Duties also include the facilitation of weekly safety meetings as well as conducting risk assessments and investigations.

Following is the list of items the safety officer must consider during inspection of working environment and condition. This list will should vary according to the design and type of ship. The more complex the vessel, such as a drill ship or cruise ship will entail more complex duties.

- Ensure that all means of access are in safe condition, well lit, and unobstructed
- Warning notices are put in case access is in dangerous conditions or removed for maintenance
- Ensure lock out tag out, hot work and aloft permit conditions are enforced
- All equipment stowed in the access area are properly secured
- The guard-rails are in good condition, secure, and in place
- All fixtures and fittings that cause potential hazards are suitable painted and marked
- All openings through which a person can fall, are fenced suitably
- Working areas should be well ventilated
- The area should be clear off all unwanted items, rubbish, combustible material, oil spill etc.
- All dangerous goods and substances are not left in the area or stored dangerously
- All loose tools, stores and similar items are secured properly
- The machinery system are properly guarded where necessary
- All necessary operating instructions are clearly displayed
- All required safety signs are clearly displayed
- All crewmembers must wear personal protective clothing and equipment
- All protective clothing and equipment are in good condition and used properly
- Ensure that proper steps are being taken to rectify defective equipment
- Adequate supervision is provided for new or inexperienced crew.

It is the duty of the safety officer to check that all statutory regulations and company safety procedures are complied with. He must also ensure that all safety procedures provided by publications and company is followed. It should be noted that in the United States officers could be held financially libel in the case of crew injuries. They may be held criminally libel in the case of a crewmembers death.

Remote Vehicle Operation:

The pace of technology is changing our industry. We have all seen the advent of GPS, ARPA, GMDSS and automation at all levels of marine operations. The next technology coming into the forefront of the maritime domain is Remote Vehicle Operations. As we go forward more and more of human centric positions are being replaced by this technology. The phase in of ROV operations are doing away with jobs

that can be both mundane and hazardous. Divers cleaning hulls will very soon be an obsolete enterprise. Robotic hull cleaning and inspection devices are becoming the norm for in water husbandry. In above water operations aerial drones are being utilized for inspection of masts and cargo gear. Drones are replacing the manual inspection of cargo holds and tanks with multiple sensors and video recording capabilities⁵⁶. This allows for a permanent digital record rather than an inspectors notebook.

Given the advent of these technologies our institutions should make the training available to students as either a minor or a certificate program within a degree.

The Federal Aviation Authority governs the operation of a remote vehicle in the United States⁷. These laws mandate the training required to operate commercial drones, in effect one is considered a pilot.

Subsea remote operated vehicles have been in operation in the offshore oil industry as well as laying sub-sea cables. Generally the operators are highly trained specialists within engineering disciplines. As the cost of the technology has decreased acceptance of ROV's have become widespread within the maritime sphere. The operation of these devices, weather autonomous or directly controlled does not require the technical prowess of the offshore oil and cable laying technologies. It does however require some specialized training and in some cases licensure. There are institutions that do provide the training both domestically in the United States⁸ and globally⁹. In examining the courses offered for either aerial or marine ROV's.

Conclusion:

As global shipping moves into autonomous and semi autonomous vessels courses such as these will ensure our graduates relevance in the rapid environment of change we find ourselves in. Specialization within a traditional discipline will allow for a more rewarding career and position our graduates to keep current and employable. The paths discussed can lead to rewarding shore positions as a mariner transitions out of onboard positions.

The additional training either required or suggested can be accomplished within a university framework. It allows opportunities for interested faculty to do research as well as contribute to the ever-developing regulatory framework. Regulations are currently being developed by classification societies, such as DNV-GL as well as other bodies. These regulations will be codified within the International Maritime Organization framework. The acceptance and understanding will allow institutions within the IAMU a seat at the table and a voice in shaping the future.

⁵ <https://www.dnvgl.com/news/guidance-on-use-of-mini-rov-mou-ballast-tank-inspections-44318>

⁶ <https://www.dnvgl.com/news/in-water-bottom-surveys-by-means-of-remotely-operated-underwater-vehicle-rov-are-accepted-by-dnv-gl-47220>

⁷ Public Law 112-90, Title III subtitle B as well as CFR Part 1, Part 21 H

⁸ <http://www.atlantic.edu/program/degrees/UnmannedAircraftSystemsSpec.html>

⁹ <https://www.theunderwatercentre.com/fort-william/rov-training/rov-courses/>