

**Marine Engineer's Handbook -  
A Resource Guide to  
Marine  
Engineering**

Marine Insight<sup>©</sup>

## A Resource Guide to Marine Engineering

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1. Marine Engineering vs. Nautical Science
2. Engine vs. Deck Department
3. How to Become Marine Engineer ?
4. Hierarchy in Engine Department
5. Important Documents for Marine Engineers
6. Important Courses for Marine Engineers
7. Important Books for Marine Engineers
8. Further Studies for Marine Engineers
9. Marine Engineering Resources



In order to have a successful career at sea, it is important you make the right decisions at the start.

Degrees in nautical science or marine engineering are two ways in which one can get a job on ships.

However, choosing between engine and deck departments is one such decision that often bothers students.

There have been several cases wherein students have taken up deck or engine side just to realize later that they are more inclined towards something else.

It is therefore extremely important that one knows in advance what field they are going to pursue and what job they would be doing later on ships.

So what is the difference between nautical science and marine engineering? How would you know which one to choose and what to expect from each?

## **Difference between Marine Engineering and Nautical Science Degrees**

### *Marine Engineering*

[Marine engineering](#) is a field that deals with the engineering aspect of the maritime industry. Like any conventional engineering course, marine engineering is a four year course which prepares an individual to become an engineer on ships.

Marine engineering is all about machinery on ships, boats, yachts, or any sea going vessel. There are several other technical streams that sprout out from this field.

The curriculum of the course focuses on teaching specialized knowledge of both theoretical and practical marine and mechanical engineering. Greater importance is given to impart skills and competencies that are required to operate and maintain machinery on board ships.

The subjects taught in the first and second year of the course are almost the same as those taught in conventional mechanical engineering.

The main aim is to introduce engineering sciences to the students and make them understand the applications of those sciences in various aspects of marine engineering.

The third and fourth years are totally dedicated at imparting marine technical knowledge. Both theoretical and practical aspects of marine machinery are covered with special focus on ship's operation and maintenance of marine machinery.

Practical knowledge through laboratory and workshop training is provided throughout the four years of the program, so that students get hands-on knowledge of dismantling and maintenance of machines on ships.

### *Nautical Science*

While marine engineering makes an individual a ship's engineer, nautical science prepares a person to become a deck officer. Nautical science is a three years course after which the student joins a ship as trainee cadet.

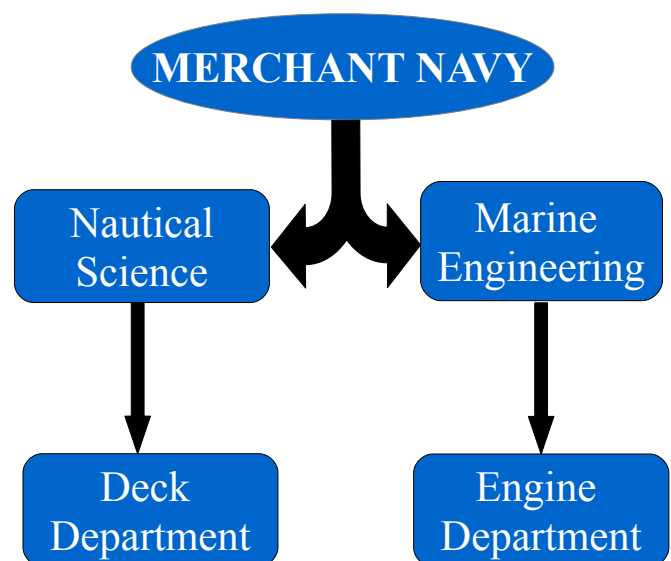
After completing sufficient time at the sea and clearing required competency exams, promotion is granted considering past performance.

Nautical science imparts nautical technology knowledge which is important to become a deck officer on board ships.

Theoretical and practical knowledge required for navigation, cargo operation, ship maintenance and operation is imparted during the three years course, along with exposure to some areas of humanities and social sciences.

Hands-on training is extremely important as a deck officer and thus detailed procedure and maintenance techniques of important deck machinery is an integral part of this course.

Emphasis is also given on providing specialized knowledge on subjects such as seamanship and working in marine environment.





*Engine Vs Deck Department*



People planning to join Merchant Navy often ask what is better – engine department or the deck department? Though there is no specific answer to this question, understanding important aspects of both the sides is very important.

Before deciding between engine and deck departments, we ask students to keep [these five things in mind before joining merchant navy](#).

Then for anyone who is confused between engine side and deck side, it is important that he or she first understands the difference between Nautical Science and Marine engineering. (People who study nautical science become deck officers and those who study marine engineering become marine engineers).

Knowing about various subjects one has to learn in each of these streams helps to get rid of most of the doubts involved with deciding between the two departments.

A career in merchant navy is unlike any other career and every person planning a career in the same would know about it.

In case you don't, read them here - [Reasons as to why a career in merchant navy is unlike any other](#).

People confused between engine and deck sides, often have queries regarding the following aspects:



Let's look at each aspect individually.

### *Salary structure*

Salary structure of both engine and deck departments is almost the same. This means that officers at corresponding rank in both the departments earn almost equally. The article on [average range of salaries of officers on ships](#) would help to resolve the doubt.

### *Job profile*

Though the job profile and nature of duties of officers in both the department are different, at the end it is an individual's choice as to what side to choose.

Work profile in both engine and deck departments is challenging and rewarding. It's the person's prerogative to decide between engine side and navigation side.

### *Future prospects*

A ship cannot run without engine officers and deck officers. Thus the need of both the type of officers will always be there (Unless they come up with totally unmanned ships). Both the sides have bright and respectable futures.

### *Placement and job market*

This is one aspect which bothers the most especially to those who are just entering the field. Though there are [several reasons because of which deck cadets and junior marine engineers are not getting jobs](#), the situation is expected to improve soon.

However, it is to note that employment problems are prominent in every field at the starting level and it's the same with merchant navy as well. Officers of higher ranks from both engine and deck departments are always in demand.

### *Onshore opportunities*

For those who also consider on shore job prospects must note that there are [several opportunities on shore of merchant navy officers](#).

Experienced marine engineers and deck officers can get jobs in the management department of shipping companies.

Marine engineers can take up shore based jobs as Design, Seismic, and Maintenance Engineers. They can also take up the job of trainee surveyors. Nautical officers as well as marine engineers are also required in Chartering / Ship Brokerage firms.

However it is advisable to sail for certain years and take good amount of experience before shifting to shore jobs. Those who are interested in future studies can do an MBA in Shipping and improve their job options on shore. Read more here – [How to do MBA in Shipping?](#)

Thus, a career in both engine and deck department is a rewarding and challenging one. At the end, it is up to the individual to decide what he or she is more passionate and interested about.



## *How to become Marine Engineer?*

Marine engineering is a job that is very much sought after around the world. The growth of the industry and the continued research and development in the field has rubbed off on the academic study of this engineering field and more people have started to opt for it.

The increase in the commercial activities, across the seas also has a positive impact on marine engineering with unprecedented rise in the number of merchant navy vessels and trading. All these have had a positive impact on the job market in this dynamic sector. Certain attributes are pre-requisite for any job in the merchant navy or as a marine engineer, whereas there are other required qualifications which vary for different profiles.

There are [colleges](#) that offer both degree and post graduate courses in marine engineering. For someone who has ambitions of becoming a marine engineer, this is supposed to be the first base. The eligibility, required to take an admission in these courses is pretty much the same around the world.

The length of the graduate course of engineering may vary slightly in some countries, but in general it is 4 years, wherein the student undergoes comprehensive training in both theoretical as well as practical aspects of the science.

In some cases practical sessions are conducted in-house and some of the sessions are also conducted at real sites like shipyards or real ships. The theoretical subjects include, apart from English, which is the most widely understood and used language in merchant navy, computer science, applied mathematics, physics, electronics and marine management.

Besides these there are several other subjects that are covered and students are educated regarding environmental science, maritime commerce, control systems etc. These trainings are necessary for anyone aspiring to be a marine engineer or who wants a job in the merchant navy as it not only adds to the mental abilities but also inculcates physical attributes. For better prospects in the existing job or



the open job market, a masters degree in marine engineering is definitely advisable. The training albeit enhanced is not that difficult, especially for a graduate student of the same discipline as it comprises mostly of lab hours that put into practice the various principles of engineering studied previously.

Creating a portfolio helps anybody trying to climb the hierarchy of seniority in the merchant navy. In any case, the most successful in this field are definitely the ones who had a clear idea of what they wanted out of this industry and which of their characteristics suited it the best.

With the recent studies predicting a steady growth in the international trade, this industry is more or less set to keep on progressing.

This is because 'shipping' is still the easiest and cheapest mode of transportation around the world. Therefore the profile of a marine engineer would remain a center of attraction for the youth for a long time to come.

If you are a mechanical engineer and wish to get a job in the merchant navy, then you can do so by becoming a marine engineer using your mechanical engineering degree. [Find out how to do marine engineering after mechanical engineering here.](#)

Mechanical and [marine engineering](#) courses have several subjects in common and this makes it easier for a mechanical engineer to

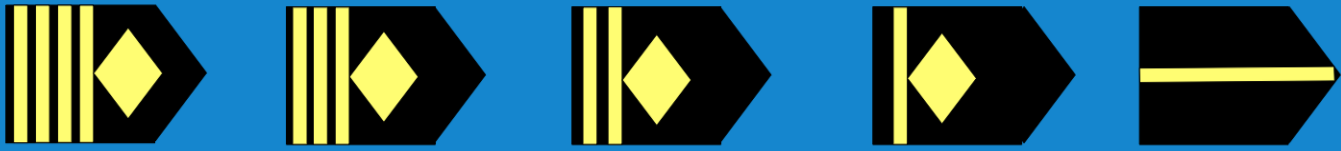
get an additional degree in marine and open new doors of opportunities.

A one year Graduate Marine Engineering (GME) course after mechanical engineering would give students the license to enter merchant navy. This one year GME course is all you need to become a marine engineer after doing mechanical engineering.

### *Eligibility Criteria*

However, there are certain requirements which one should satisfy in order to join the one year marine engineering course. They are as follows:

- Graduation in BE (Mechanical) Engineering / [Naval Architecture](#) with minimum marks of 50% in final year
  - Must have minimum 50% marks in English language at 10<sup>th</sup> or 12<sup>th</sup> or in Degree Exam
  - Must not be more than 28 years old and should satisfy all health requirements that are necessary to join the merchant navy.
- To know more about the medical health requirements, read [Physical Fitness and Medical Requirements to Join Merchant navy.](#)



### Hierarchy Level in Engine Department

The nomenclature of merchant navy ranking system is universally accepted by shipping companies and commercial vessels around the world. However, there can be minor changes in names and duties assigned to specific positions depending on the country to which the ship belongs.

### The Engine Department

- Chief Engineer
- Second Engineer/First Assistant Engineer
- Third Engineer/ Second Assistant Engineer
- Fourth Engineer/ Third Assistant Engineer
- Fifth Engineer/ Engine Cadet
- Engine Room Rating
- Fitter
- [Motorman](#)
- [Wiper](#)
- Trainee Fitter / Trainee Wiper

**Chief Engineer:** Chief engineer is the head of the engineering department on a vessel. The required qualification for this

position is loosely referred to as the “Chief’s Ticket”. Alternatively, he can also be termed as the “The Chief” and usually draws the same payment as the Captain, although the complete responsibility of a particular vessel falls solely on the Captain’s shoulder.

The Chief Engineer cannot take over the ship’s charge, unless such a situation arises which has been documented under the safety measures.

Chief engineer gives orders for operation and maintenance of ship’s machinery system and is responsible for the entire engine room department.

**Second Engineer/ First Assistant Engineer:** He is associated with the day-to-day activities in the engine room, and is accountable to the Chief Engineer.

He stays extremely busy most of the time on board, as he needs to constantly supervise the proper functioning of all engine room machinery systems and also assigns jobs to the other engine officers and crew. The

Second Engineer generally keeps watch on the engine room, during the day time.

### *Third engineer/ Second Assistant*

**Engineer:** This is the next position after the Second Engineer, and is assigned jobs to look after machinery ordered by the chief engineer, along with carrying out daily watch keeping. He reports to the second engineer.

### *Fourth Engineer/ Third Assistant*

**Engineer:** This is the lowermost operational rank in the engineering department. The Fourth Engineer is concerned with the correct working of the machinery systems assigned to him and also carry our watch keeping. He reports to the second engineer.

### *Fifth Engineer/ Engineering Cadet:*

Fifth engineer is a trainee under the Second Engineer officer, and he assists and learns while observing and carrying out activities in the engine room. He would accompany a senior officer (mostly second engineer) during the watch duty.

**Engine Fitter:** The engine fitter is responsible for doing maintenance of all pipe and fitting jobs including welding, cutting and other workshop operation as instructed by the engine room in-charge.

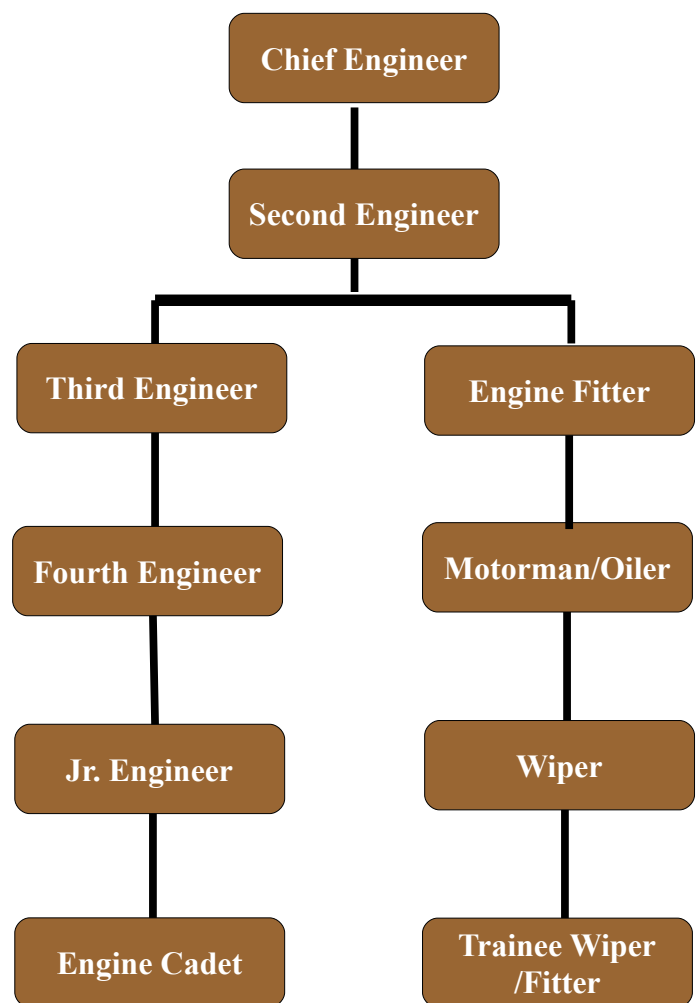
**Oiler/ Motorman:** Being a motorman would need you to remain on your alert best to make sure that the overall machinery

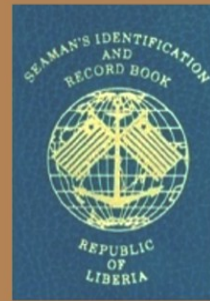
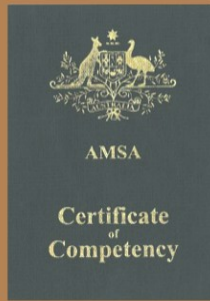
always remains in working conditions. He assists the watch keeping officer.

**Wiper:** Wiper looks after the cleaning and painting job in the engine room and also does house keeping jobs.

**Trainee wiper/ fitter:** Trainee wiper are sent onboard for training purpose as per the rank appointed and will be assisting wiper or fitter in the daily routines.

All the engine room ratings report to the second engineer.





## *Important Documents for Marine Engineers*

For those young engineers who don't have any immediate association with the Merchant Navy field, the time after graduation from a maritime academy can be rather confusing.

Also, in the quest for seeking employment, Engine cadets often forget to get their important documentations ready. It is therefore important that junior engineer do not ignore the necessity to keep all documentations ready, in order that they may produce them to the employer whenever required.

Also, prior to seeking employment, during the visits to Mercantile Marine Department (MMD) to get a variety of work done, these documents must be kept assorted in folder at all times.

***CDC (Continuous Discharge Certificate):*** Perhaps the most important thing for a seafarer, this booklet must be kept handy at all times. The CDC number is

always required when filling out application forms for a job, to do maritime courses, for endorsement etc.

***INDoS (Indian Database of Seafarers):*** Another important document that must be carried at all times. [Read more about INDoS number here](#). Every country has their own system of maritime database and fresh marine engineers must apply for their number as soon as possible.

***STCW (Standards of Training, Certification and Watch keeping) Certificates:*** The mandatory [STCW certificates](#) comprising of PST (Personal Survival Techniques), PSSR (Personal Safety and Social Responsibility), EFA (Elementary First Aid), FFFF (Fire Prevention and Fire Fighting). All these are mandatory courses which are to be carried out by sea going professionals.

***Passport:*** The ultimate proof of identity for seafarers apart from CDC. Seafarers are

advised to keep passport always with them when getting documentation related work done. Junior engineers must carry this everywhere.

**Photographs:** It is always necessary to carry a few extra copies of passport sized photographs while going for documentation.

**Course Completion Certificate:** The proof of having completed the tenure of study at college. A certificate of degree/diploma is required for all documentation processes.

**Xth/XIIth mark sheet:** These may be required for proof of age and to verify other important details.

As mentioned earlier, a few visits to the MMD is required to get a variety of necessary work done. Following are the procedures to be completed before setting sail for which, the above mentioned documents shall be required:

1. **Yellow Fever Vaccination:** This vaccination is required for individuals traveling to South American and African countries. The shot can be obtained from the MMD (Mercantile Marine Department) for a fee of INR 300/- (Will vary according to the country).

For this, documents required are photocopies of front and back pages of the CDC and Passport. Prior booking for the vaccination has to be done from the office

of the Port Health Officer. The vaccination is valid for 10 years. This can be obtained even without an offer letter from a company.

2. **Engine room simulator certificates:** The simulator training certificate is another requirement for applying to class 4 or class 2 level examinations.

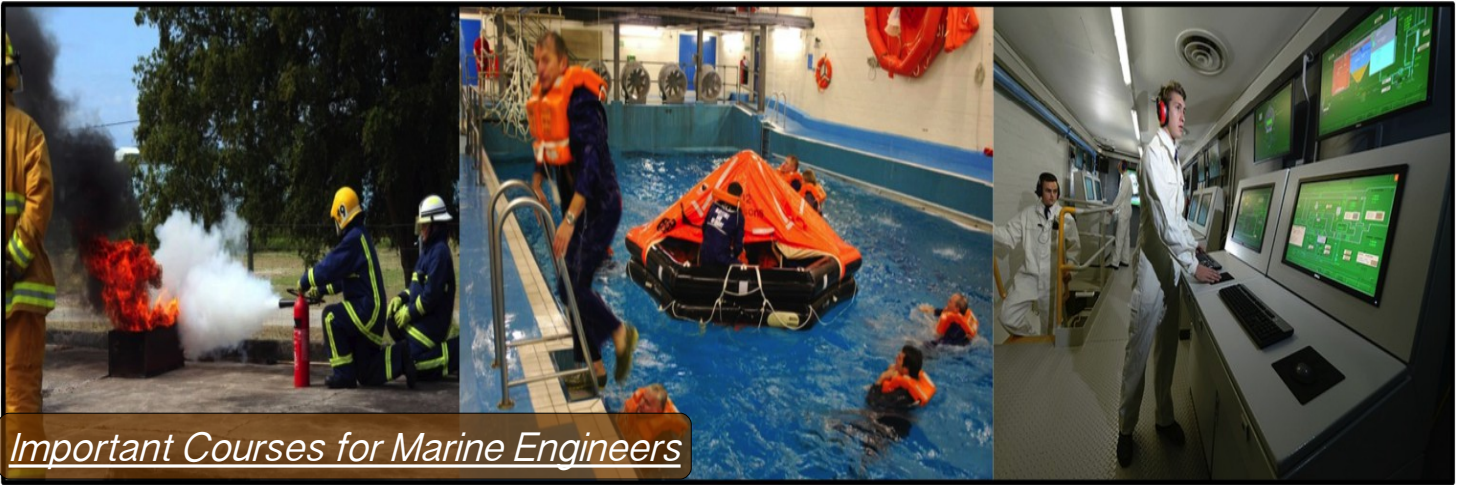
3. **OTF/GTF/CTF:** Depending on the vessel the cadet will be sailing on, the respective course needs to be done for the particular type of vessel (Oil/Gas/Chemical).

Always check for DG approval status on the website ([www.dgshipping.com](http://www.dgshipping.com)) before choosing the course at an institute.

4. **Dangerous Cargo Endorsement (DCE):** The OTF/GTF/CTF certificate completed can be rendered invalid if it is not endorsed at the MMD.

Depending on the type of ship the Marine Engineer will be sailing on, the necessary certificate (OTF/GTF/CTF) should be endorsed for a fee.

Remember to include each and every document mentioned in the DCE checklist. The medical certificate is a bit tricky so it is advised to go through the exact tests and checkups required for the medical certificate to be considered appropriate.



### *Important Courses for Marine Engineers*

Marine engineers have to do a number of mandatory certification courses before they get on the ship. They are as follows:

#### *1. STCW Courses*

The Standards of Training, Certification, and Watch-Keeping (STCW) Courses for Seafarers are to be done by all marine engineers. STCW courses include:

*EFA* – Elementary First Aid

*MFA* – Medical First Aid

*BFF* – Basic Fire Fighting

*AFF* – Advanced Fire Fighting

*PSCRB* – Proficiency in Survival Craft and Rescue Boat

*PST* – Personal Survival Techniques

*PSSR* – Personal Safety and Social Responsibility

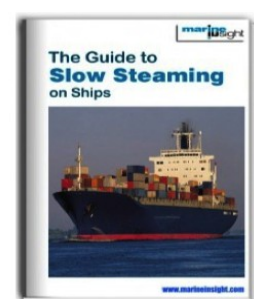
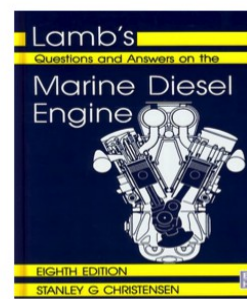
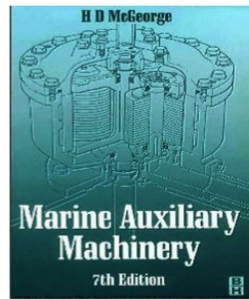
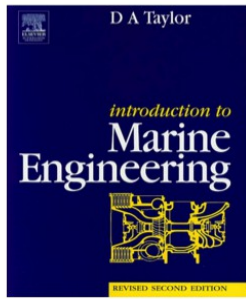
These courses are to be undertaken at institutes/courses providers certified by the country's shipping authority.

*2. Operational Level Engine room simulator course (for 4<sup>th</sup> and 3<sup>rd</sup> engineers)*

*3. Management level engine room simulator course (for 2<sup>nd</sup> and chief engineers)*

*4. CFT/ OTF / GTF – Container/Oil tanker/ Gas tanker familiarization courses depending on the type of ship*

*5. Certificate of Competency (COC) Course*



### *Important Marine Engineering Books*

Marine engineering is a specialized subject, which requires equally specialized books to learn and understand the concepts. Marine engineers, both students and sea-going professionals, have to continuously keep themselves abreast with the changing technologies and policies in the maritime field.

Though there are several books out there to learn about marine engineering and its subjects, there are a few that are extremely comprehensive and useful for mariners around the world.

We have handpicked some of the best marine engineering books, which should be there in the collection of every marine engineer.

#### *Introduction to Marine Engineering – D.A. Taylor*

One of the finest and most read books on marine engineering, Introduction to marine engineering by D.A. Taylor provides information on every aspect of the ship's machinery systems. An extremely valuable

guide for maritime professionals, this is a “must-have” book for those studying marine engineering or preparing for competency exams.

#### *General Engineering Knowledge (Marine Engineering) – H.D McGeorge*

General Engineering Knowledge by H.D McGeorge is the perfect text book for those seeking a one-stop resource for marine engineering subjects. Though it doesn't provide in-depth insights in the working of all machinery, the book is quite useful for getting a general overview of all the important points of every machine on ship.

#### *Marine Auxiliary Machinery – H.D McGeorge*

Yet another masterpiece by H.D McGeorge, the Marine Auxiliary Machinery is a highly respected book for both students and sea going marine engineers. This book is the ultimate guide for marine auxiliary machinery and provides comprehensive information on operation, care, and maintenance of ship's machinery and apparatus.

### *Lamb's Question and Answers on Marine Diesel Engines – S. Christensen*

Lamb's Question and Answers on Marine Diesel Engines is a one-stop resource for knowledge on marine engines. From the most basic concepts to the most advanced principles, this book covers everything in an easy-to-understand format. Without doubt, the Lamb's book on Marine Diesel Engines is the best book in the market for understanding marine engines.

### *Pounder's Marine Diesel Engines and Gas Turbines – Doug Woodyard*

Pounder's Marine Diesel Engines and Gas Turbines is one of the oldest books on marine diesel engines and gas turbines. Now in its ninth edition, the book has extensively helped both students and sea going engineers to understand technology and concepts behind marine diesel engines and gas turbines.

### *Marine Electrical Equipment and Practice – H.D McGeorge*

An important book in the H.D McGeorge's marine engineering series of text books, the Marine Electrical Equipment and Practice by H.D McGeorge is an important book for marine engineers who seek to understand ship's electrical equipment and operating principles.

### *Marine Boilers – G.T.H Flanagan*

An extremely comprehensive and important book on marine boilers used on ships, this book on marine boilers provides information on boilers and associated equipment as used at sea. A must-have book for all marine engineers appearing for competency exams, it covers every aspect of marine boilers and its types used on ships.

### *Reed's Basic Electrotechnology – Marine Engineering Series*

Reed's sixth volume of marine engineering series deals with electrotechnology and electrical engineering principles of the ship. A step-by-step solution of a variety of electrical systems is provided in an easy to understand format. This book should be with every marine engineer going to the sea.

### *Practical Marine Electrical Knowledge – Dennis T. Hall*

Practical marine electrical knowledge is a famous book by Dennis T. Hall. The book provides knowledge of the ship's electrical system, including the generation plant, switchboards, and distribution network. It also focuses on electrical safety and safe working practices required on the ship.

### *Ship Construction – David J. Eyre*

Ship construction by David J. Eyres is a comprehensive book on shipbuilding and shipyard practices for marine engineers and naval architects. It also provides latest developments in the construction of



different types of ships and safety practices. This is an essential book for both maritime students and professionals working in the field of ship construction and maintenance.

### *More Recommended Books for Marine Engineers*

*Reed's Marine Engineering Series, Vol. 8* – General Engineering Knowledge for Marine Engineers

*Reeds Marine Engineering Series, Vol. 12* – Motor Engineering Knowledge for Marine Engineers

*Introduction to Naval Architecture, Fourth Edition* – E.C. Tupper

*Notes on Instrumentation and Control (Marine Engineering Series)* – G.J. Roy

*Reed's Instrumentation and Control Systems, 4th Edition* – Marine Engineering Series

*The Running and Maintenance of Marine Machinery* – Cowley

*Principles and Practice of Marine*

*Diesel Engines* – Sanyal

[Get the Complete List of Marine Engineering Books Here.](#)

*Additional important books for marine engineers*

[Top 6 Books on Marine Auxiliary Machinery](#)

[Top 6 Books on Marine Boilers](#)

[12 Important Books Every Seafarer Must Have](#)



### *Further Studies for Marine Engineers*

For some people one education degree is never enough. These are people who crave of knowledge, irrespective of the field they are in.

If you have a degree in [marine engineering](#)/naval technology and are one of those who want to study further after securing a degree in merchant navy, then read on.

It is not necessary that after obtaining a degree in marine engineering one has to forcibly go on ships.

If you have the patience and are willing to study further, there are several opportunities on shore which are equally lucrative.

However, kindly note that not all post graduation courses would facilitate you with a land job, but yes, most of them would.

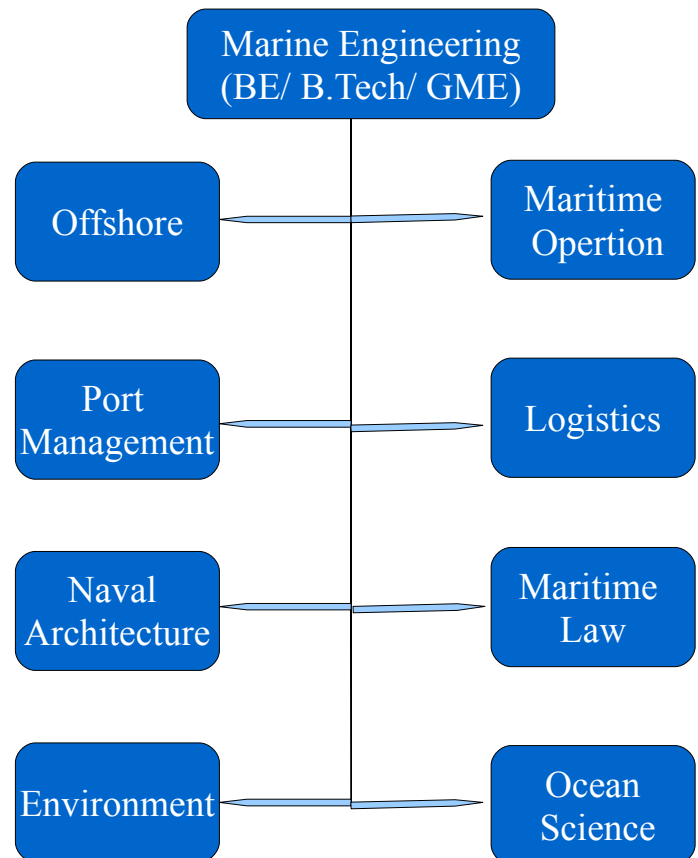
Following is a list of post graduation courses that can be done after a bachelor degree in marine engineering/ naval technology.

### *Post Graduation Courses*

- MSc marine engineering
- Post Graduate Diploma in Marine Engineering
- MSc Coastal and Marine Engineering and Management
- MSc Marine Studies and Coastal Resource
- Management and Higher National Diploma in Marine Engineering
- [Naval Architecture](#) and marine sciences
- Naval Architecture and ocean engineering
- Marine drafting
- [Ocean engineering](#)
- Naval Architecture and Ship building
- Coastal engineering and management
- Masters in Shipping and Transport
- Marine Transport design
- MSc Technical management of ship operation
- MSc [Subsea engineering](#)
- MSc in Offshore Floating Systems
- MSc Marine and Offshore Power

## Systems

- Offshore and Environmental Technology
- Pipeline engineering
- Subsea Engineering and Management
- Sustainable energy technologies (marine)
- [Submarine](#) design and technology
- Maritime operations and management
- PG Diploma in International transportation and Logistics
- Port Management
- MSc Remote Operated Vehicle (ROV)
- System and Design
- Ship and offshore Structure
- MSc Marine Sciences
- MSc Marine Zoology
- MSc (Marine Sc.) specialization in Marine biology, Marine geology, Marine geophysics,
- Chemical oceanography, Physical Oceanography, M.Sc. (Meteorology & Oceanography)
- MSc Marine geology
- MSc Ocean Life Sciences
- MSc in Marine bio. Oceanography
- MBA in Shipping
- MSc in marine biology
- [Maritime Law](#)



Maritime Industry provides a myriad of opportunities for those who want to explore different areas of the marine world. A post graduation in any of the above mentioned courses would open doors to a range of new opportunities in the maritime field itself.



The maritime industry is a rapidly changing one and [marine engineering](#) is an integral part of it. Marine engineers working in the industry have to keep themselves abreast with the latest developments and regulations.

Needless to say, in a field like marine engineering, the process of updating oneself is a continuous one and there is a lot to learn.

Coming to marine engineer's main job, which require them to operate and maintain ship's machinery, learning the basics of marine engineering is as much important as understanding advanced concepts of ship's engine room through experience and practical knowledge.

This marine engineering tutorial will guide you through all the important machinery systems of ships and their working.

## *Main Engine*

The propulsion engine or the main engine is

what drives the ship. The biggest machine in the engine room, the main propulsion engine makes a major part of marine engineering learning.

[8 Engine Terms Every Marine Engineer Should Know – Part 1](#)

[8 Engine Terms Every Marine Engineer Should Know – Part 2](#)

[Troubleshooting: Excessive Loss of Water from Main Engine Fresh Water Expansion Tank](#)

[How to Use Main Engine Performance Curve for Economical Fuel Consumption on Ships?](#)

[The Essential Marine Engine Maintenance Guide For Marine Engineers](#)

[How Spark Erosion Can Damage the Main Propulsion Engine of a Ship?](#)

[Understanding Diesel Engine Performance](#)

[How Massive Main Engines are Fitted in the Ship's Engine Room?](#)

[Wartsila v/s MAN Marine Engines- Who's Got the Edge?](#)

[How Variable Geometry Turbocharger for Marine Engines Works?](#)

[Intelligent Cylinder Lubrication for Modern Marine Engines -Part 1](#)

[8 Ways to Achieve Efficient Combustion in Marine Engines](#)

[Reasons for Failure and Misalignment of Crankshaft in Marine Engines](#)

[Video: Operation of Main Engine Starting Air System](#)

[What is Power Balancing of Marine Engines?](#)

[What is an Entablature in Ship's Engine?](#)

[4 Ways to Measure Main Bearing Clearance of Two Stroke Marine Engine](#)

[Understanding Vibrations in Marine Propulsion Engines](#)

[Dampers & De-tuners: Reducing Vibration of Marine Engines](#)

[10 Steps for Converting a Conventional Marine Propulsion Engine to an Intelligent Electronic Controlled Engine](#)

[How to Tackle Low Load Operating Conditions of Marine Propulsion Engine?](#)

[12 Terminologies used for Power of the Ship's Marine Propulsion Engine](#)

[How Marine Propulsion Engine of the Ship is Protected?](#)

[Main Engine Liner Removal Procedure for S50MC-C Engine](#)

[Types of Main Bearings of Marine Engines and their Properties](#)

[Procedure for Cross Head Bearing Removal of Marine Engine – MAN B&W S50MC-C](#)

[Chain Tightening Procedure for MAN B&W Engine](#)

[What is a Brace or Strut for Marine Engines?](#)

[Jack Bolts for Marine Engine and the Procedure for Tensioning](#)

[Hybrid Turbocharger for Marine Engines: Maritime Technology Innovation](#)

[Procedure for Removing Main Bearing of MAN B&W MC-C Engine](#)

[Why 2-stroke Engines are Used More commonly than 4-stroke on Ships?](#)

[The Most Popular Marine Propulsion Engines in the Shipping Industry](#)

[What are Breaking-In and Running-In in Marine Diesel Engines?](#)

[How is Marine Engine Repair Done On board a Ship?](#)

[Reasons for Cylinder Liner Wear and Ways to Measure it](#)

[Intelligent Engines – The New Generation Machines](#)

[An Overview of Common Rail System of Marine Engines](#)

[Piston Skirt, Piston Rod and Trunk Piston](#)

[Types of Piston Rings and Piston Ring Maintenance](#)

[Understanding Indicator Diagram and Different Types of Indicator Diagram Deficiencies](#)

## *Boiler*

Boiler is one of the main supporting machinery systems in the ship's engine room. A part of the marine engineering syllabus, boilers are found on every type of cargo ship and thus need special attention during maintenance.

[Energy Audit on Ships: Audit of Marine Boiler](#)

[Energy Conservation in Boilers and Making a Boiler Report](#)

[What to do When Flame Failure or Fuel Pump Tripping in Marine Auxiliary Boilers Occurs?](#)

[Understanding Boiler Feed Water Contamination](#)

[MAN B&W's Dual Fuel Marine Engine : A General Overview](#)

[Boiler Mountings: A Comprehensive List](#)

[Important Points for Boiler Cleaning on a Ship](#)

[Boiler Operation Made Easy : Procedure for Starting and Stopping a Boiler](#)

[Blow-Down Procedure for Marine Boilers](#)

[The Science behind Marine Boiler Water Circulation on Ships](#)

[Boiler Starting Failure – Troubleshooting](#)

[Procedure for Boiler Gauge Glass Maintenance on a Ship](#)

[Everything You Ever Wanted to Know About Scavenge Fires](#)

[How to Prevent Crankcase Explosion on a Ship?](#)

[What is Turbocharger Surging?](#)

[Everything You Ever Wanted To Know About Crankcase Inspection on a Ship](#)

[What is Steam Hammering in Ship's Steam System?](#)

## *Refrigeration*

Refrigeration system is used for several purposes on ships. The air conditioning and refrigeration plant of the ship need regular monitoring in order to ensure smooth functioning. If you are a marine engineer or a

marine engineering student, then understanding working and maintenance of refrigeration system is of utmost importance.

[What are the Safety Devices on the Refrigeration System of a Ship?](#)

[Construction and Working of Ships Refrigeration plant](#)

[Guidelines on Quality of Refrigerant Used on Ships](#)

[Understanding Capacity Control in Ship's Air Conditioning and Refrigeration System](#)

[How to Charge Refrigeration Plant on Ships?](#)

[Everything You Ever Wanted to Know About Container Refrigeration Unit](#)

## *Electrical*

Electrical knowledge is extremely important while handling ship's machinery systems. Power generated and supplied on ships requires both basic and practical marine engineering knowledge, which comprises of several aspects of electrical engineering.

[How is Power Generated and Supplied on a Ship?](#)

[Preferential Trips on Ship : Construction and Working](#)

[Single Phasing in Electrical Motors: Causes, Effects, and Protection Methods](#)

[Construction and Operation of Megger Explained](#)

[Permanent Magnet Moving Coil Instrument \(PMMC\) – Working and Application on Ship](#)

[What are the Main Safety Devices for Main Switch Board on Ship?](#)

[Electrical Safety Device: Air Circuit Breaker \(ACB\)](#)

[Understanding Rectifier and Rectifier Circuits on Ship](#)

[Amplifier Circuit or Operational Amplifier \(op amp\) Used on Ship](#)

[Construction and Working of 3 Phase Induction Motor on Ship](#)

[Maintenance of Electrical Relay on Ships Electrical Circuit](#)

[How to Find an Earth Fault On board Ships?](#)

[Why are Transformer and Alternator Ratings in kVA on Ships?](#)

[Reasons for Using High Voltage Systems On board Ships](#)

[How to Install Electronic Circuits on Ship?](#)

[Electric Propulsion System for Ship: Does it have a Future in the Shipping?](#)

[Electrical Propulsion System in Ships](#)

[What is Alternate Marine Power \(AMP\) or Cold Ironing?](#)

[Important Points to Consider While Carrying out Alternator Maintenance of Ship's Generator](#)

[How to Minimize the Risks of an Electrical Shock on a Ship?](#)

[Hazards Related to Electric Cable Insulation in Case of Fire](#)

[Importance of Insulation Resistance in Marine Electrical Systems](#)

[Thermocouples: The Most Common Pyrometer on Ship](#)

[What is Lambda Control in Ships?](#)

[Electric Propulsion System for Ship: Does it have a Future in the Shipping?](#)

[Electrical Propulsion System in Ships](#)

## *Generators/ Auxiliary Engines*

Generators are the life line of ships. They are the main supporting system of the ship's engine and other important machinery in the engine room. In marine engineering domain, generators or auxiliary engines hold equal importance as main engine, if not more.

[How to Synchronize Generators on a Ship?](#)

[Important Points to Consider While Carrying out Alternator Maintenance of Ship's Generator](#)

[Procedure for Starting and Stopping](#)

[Generators on a Ship](#)

[Procedure for D'carb of Ship's Generator](#)

[Hydraulic Starting of Emergency Generator](#)

## *Air Compressor*

Air compressor does an important job of supplying compressed air to ship's engine and to other machinery systems. This is one of the auxiliary systems under marine engineering which should never be neglected.

[Procedure for Starting Breathing Air Compressor On a Ship](#)

[What is Clearance Volume or Bumping Clearance in Air Compressors?](#)

[The Basics of Air Compressor On a Ship](#)

[Troubleshooting Air Compressors on a Ship: The Ultimate Guide](#)

[Efficiency of Air Compressor and Uses of Compressed Air on a Ship](#)

[Air Compressor on a Ship: Checks for Starting and Stopping a Compressor](#)

[Safety Features and Maintenance Procedure for Air Compressor on a Ship](#)

[Different Parts of a Marine Air Compressor Used on a Ship](#)

[Air bottle or Air receiver On board Ship](#)



## *Oil Water Separator*

Oil water separator (OWS) is one of the most important engine room machinery (considering the environmental concerns), which should be handled with utmost care. As a marine engineer, one must know the working and operating procedure of OWS thoroughly.

[How to Operate an Oily Water Separator \(OWS\) on Ship?](#)

[Oily Water Separator: Construction and Working](#)

## *Sewage Treatment Plant*

Sewage treatment plant is an auxiliary system which requires regular maintenance and monitoring.

Proper guidelines and maintenance procedures need to be followed while handling this marine engineering system.

[Sewage Treatment Plant on a Ship Explained](#)

[Procedure for Starting and Stopping of Sewage Treatment Plant on a Ship](#)

[Maintenance and Checks for Sewage Treatment Plant on Ship](#)

[4 Important Terms Related to Sewage Treatment Plant](#)

## *Fresh Water Generator*

Converting sea water into usable fresh water, the fresh water generator of the ship is often continuously kept running when the ship is at sea. As it supplies fresh water to almost all machinery systems of the engine room, smooth functioning of the system is of great importance.

[Converting Seawater to Freshwater on a Ship: Fresh Water Generator Explained](#)

[Reverse Osmosis: Modern Alternative for Shipboard Water Production](#)

## *Heat Exchanger*

A variety of heat exchangers are used on ships depending on the purpose and type of machinery system in the engine room. Learn about different types of heat exchangers, their working, and maintenance.

[Types of Heat Exchangers on a Ship](#)

[Heat Exchangers on Ship Explained](#)

[How to do Maintenance of Marine Heat Exchangers on Ships?](#)

## *Propulsion System*

Marine engineering mainly deals with ship's main engine, propulsion system, and machinery in the engine room.

The propulsion system is responsible for propelling the ship forward in water. Learn more about the marine engineering and propulsion system in the article below.

[Understanding Nuclear Marine Propulsion](#)

[Starting Procedure for Turbine Generator on Ship](#)

[An Introduction to Ship's Turbine Generator](#)

[What is Azipod Propulsion System on Ship?](#)

[Nuclear Ship Propulsion: Is it the Future of the Shipping Industry?](#)

[Different Types of Marine Propulsion Systems Used in the Shipping World](#)

## *Marine Growth Prevention*

Find out what is marine growth and steps taken to prevent the same.

[4 Types of Anti-fouling Systems Used on Board Ships to Prevent Marine Growth](#)

[What is Marine Growth Preventive System \(MGPS\) On a Ship?](#)

[Learn About Fatal Bacteria that Grow in Ship's Air-Con System](#)

## *Pumps/ Valves/Pipes and Bends*

Pumps, valves, and pipes form an integral

part of the ship's machinery systems.

Different types of pumps, valves, and pipes are used on ships. Learn more about them below.

[Pipes and Bends – An Essential Guide for Second Engineers: Part 1](#)

[Pipes and Bends – An Essential Guide for Second Engineers: Part 2](#)

[Pipes and Bends – An Essential Guide for Second Engineers – Part 3](#)

[Pipes and Bends: An Essential Guide for Second Engineers – Part 4](#)

[General Overview of Types of Pumps on Ship](#)

[What is a Metering Pump On board a Ship?](#)

## *Other Auxiliaries / Equipment*

Miscellaneous marine engineering technology and ship machinery.

[Viscosity Meter and Viscosity Controller Used on Ships](#)

[Understanding Stern Tube Arrangement on Ships](#)

[General Overview of Central Cooling System on Ships](#)

[Life Raft Release System and Launching Procedure](#)

[High Speed Centrifuge on Ship: Construction and Working](#)

[Bow Thrusters: Construction and Working](#)

[The Green Source of Power On Ship – Shaft Generator](#)

[Different Types of Mechanical Measuring Tools and Gauges Used on Ships](#)

[A Guide to Welding Electrodes on Ships – Part 1](#)

[A Guide to Welding Electrodes on Ships – Part 2](#)

[Energy Audit on Ships: Part 1](#)

[The Urgent Need to Reduce Nitrogen Oxide \(NOx\) Emissions from Ships](#)

[Condition Monitoring Techniques – What is Shock Pulse Monitoring \(SPM\)?](#)

## *Slow Steaming*

Slow steaming is trending topic in the shipping industry today. As the contribution of shipping industry towards environment pollution increases, various marine engineering technologies have been introduced to reduce the impact on pollution. Slow steaming is one such promising method to reduce the carbon foot prints of the shipping industry.

[A Chief Engineer's Concern Regarding Slow Steaming of Ships](#)

[Slow Steaming of Ships: Optimization of Ship's Main Engine](#)

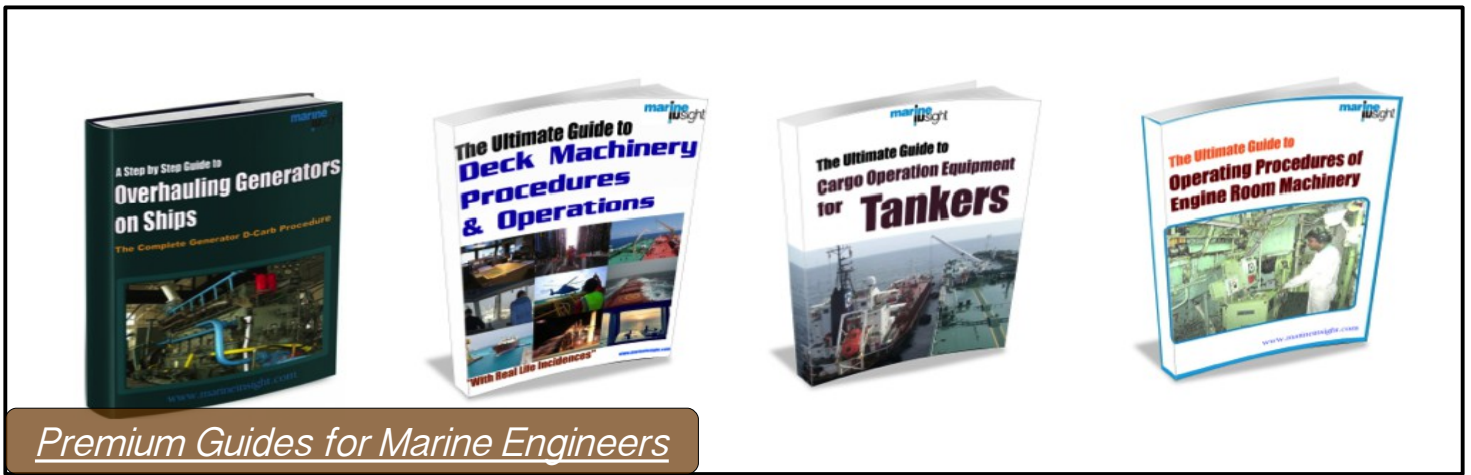
There is a lot to learn under marine engineering. We will be continuously updating this guide by adding important resources for all the subjects of marine engineering and ship technology.

Stay tuned for the Next edition.

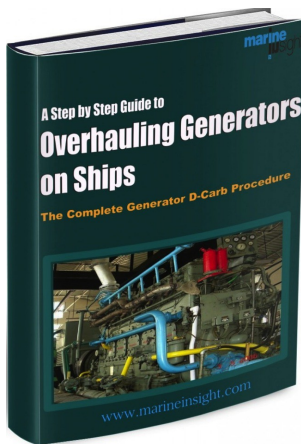
## *Efficiency/ Performance/Workshop Tools*

Learn about a variety of marine engineering technology, aspects related to engine room performance, and workshop tools and systems in the articles list below:

[List of Processes Used in Marine Workshop of Ships](#)



*Premium Guides for Marine Engineers*

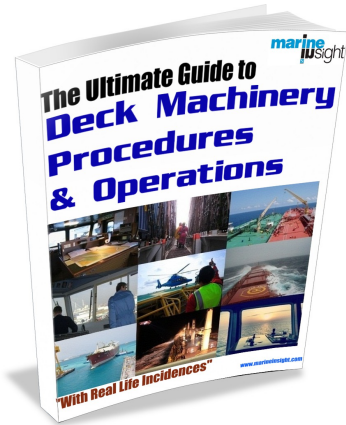
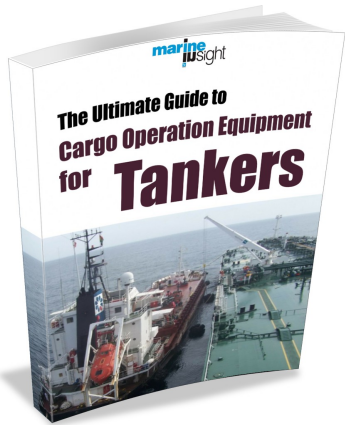


*“Needless to say, overhauling of generators requires hands-on knowledge and experience along with thorough understanding of step-by-step procedures for maintenance of auxiliary engine D’carb. ‘A Step by Step Guide to Overhauling Generators on Ships’ is a power-packed resource for overhauling generators (auxiliary engines), featuring planning, executing, and re-starting the generator. The Guide also includes all important checklists and gauging sheets required for the generator overhauling procedure.”*

*“This guide is an answer to hundreds of queries related to operating machinery received by us from marine engineers working on ships. If you are a marine engineer working on ships, this ebook would definitely help you in trying times on board. Print it and keep it as a quick reference with you, all the time. ‘The Ultimate Guide to Operating Procedures for Engine Room Machinery’ would not only help you to efficiently carry out your duties as a marine engineer but would also help you to understand the various shipping operations in a better manner.”*

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*“Maritime industry has witnessed far reaching developments from wooden boats to underwater cameras. Restructuring itself commercially, technically and operationally, the tanker industry has been constantly updating size, capacity and structure of oil tankers. Getting sophisticated each day, this sector needs seafarers to be on their toes with regards to the equipment they use and to ensure their fail safe operation. This guide will prove to be a very useful aid and will be far effective scoring upon its counterparts in terms of size, content and handiness. A must read and keep for all those who are working on tankers and those who are willing to join the tanker industry.”*

“If you are a deck officer working on ships or are studying to become one, then you must be aware of the nitty-gritty involved with deck and cargo operations. While performing duties such as standing watch for navigation and security, operating and maintaining deck equipment systems, and handling lines to secure vessels to piers or other vessels, a deck officer needs to follow step-by-step procedures in order to avoid risk to the ship and his life. Thus, following safe working procedures is a must while handling deck operations and that is exactly what this eBook provides.”

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