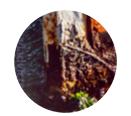


The IIMS proudly presents a brand new standalone **Professional Qualification in Marine Corrosion**, a new standard by which those who inspect corrosion can be judged against





Marine corrosion and prevention in small vessels, ships and offshore structures



Introduction

to the Professional Qualification in Marine Corrosion

IIMS is pleased to announce the relaunch and updated standalone professional qualification in marine corrosion. The programme has been written primarily with marine surveyors in mind, those whose job it is to inspect, understand and report on corrosion. That said, this course is suitable for a whole range of other professionals who need a better understanding of marine corrosion.

The update professional qualification is pitched at education level 4, examples of which are certificate of higher education (CertHE), higher apprenticeship, or higher national certificate (HNC). The developer and content producer behind the professional qualification is Dr Mike Lewus, a name known to some Institute members as he has presented at various IIMS events and seminars in recent years.

Mike has an encyclopaedic knowledge of corrosion and has spent many years as a technical lead with the British Stainless Steel Association. Each module is available to study on demand, meaning you can learn at your convenience. Modules run to approximately 2 hours each. From time to time the course will be offered in real time too.

Who should study

for this qualification?

The course is intended for marine surveyors of ships, yachts and small craft and offshore structures. It is also relevant for design engineers, material specifiers, other professional engineers and students of marine science and engineering. To gain the professional qualification, 7 of the 10 modules must be studied and passed to achieve the IIMS professional qualification. Assessment is by multiple choice tests, with a pass mark of 70% required for each module.

Though a prerequisite mathematics ability is required, the study material covered in modules 1-10 is largely descriptive in nature. Some calculations are used to underline certain structure, stability and testing concepts, but a level 3 (GCSE) or 4 (A-Level) educational standard is sufficient to tackle the examples shown.

The corrosion science, materials, chemistry, electrochemistry mechanical engineering concepts and testing principles discussed, are consistent with a level 4/5 educational standard. Consequently this course suits both professional workers in the field of marine surveying who wish to benefit from CPD material and undergraduate students or similar.

Professional Qualification in Marine Corrosion

Course Synopsis

The opening modules of the course centre on ship, smaller craft and offshore platforms architecture, design, materials for construction and corrosion control strategies. The corrosion related topics are covered in more detail in the core modules.

The course centres on steels and non-ferrous metal alloys used in complex marine structures and particularly focuses on alloy type, composition, structure and properties, suitability for prevailing service conditions and the factors that undermine performance. An over-arching theme concerns how material performance is optimised through selection of fit-for-purpose materials, design, joining practices, material storage and shipyard practices, corrosion control measures and the corrosion mechanisms that degrade materials if 'best standards of practice' are not followed.





Professional Qualification in Marine Corrosion

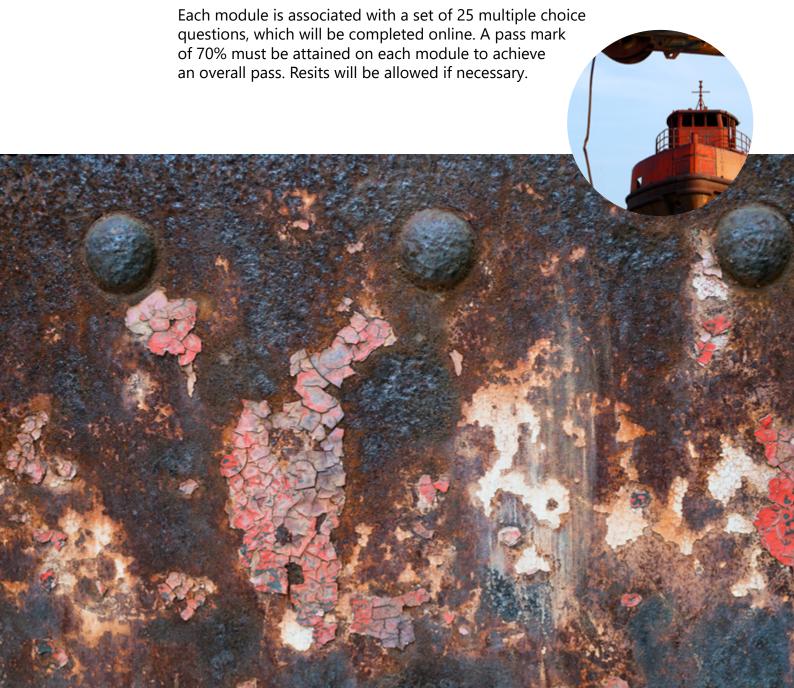
Course Structure and Assessment

The course is designed to be flexible.

The first four modules nos. 1-4 are core modules that all students are required to study.

In addition to the core modules, commercial ship marine surveyors will be required to study module 5 and choose two others from modules 6-10.

And, in addition to the core modules, yacht and small craft surveyors are required to study module 6 and choose two others from modules 5 and 7-10.



About the

Course Tutor

Dr Mike Lewus is a Director of Metal Metropol Ltd and boasts an impressive career record to date.

Over recent years, Mike and the International Institute of Marine Surveying have forged a close working relationship which has led to him presenting at Conferences and online seminars on the subject of corrosion for the benefits of members.

This professional qualification, which anyone is welcome to study, is a collaboration between Mike and the Institute and elevates the learning potential about marine corrosion to a far higher level for members of the IIMS and the wider maritime sector.

Mike's teaching experience and credentials include successful delivery of the following courses:

- Fundamentals of Metallurgy
- Principles of Heat Treatment
- Mechanical Testing Techniques
- Marine Corrosion and Prevention
- Failure Analysis

Academic Qualifications:

- PhD Materials Engineering (1987): Loughborough University of Technology
- MSc Applied Statistics (2004): Sheffield Hallam University
- BSc (hons) Applied Science (1982): Sheffield Hallam University

Teaching Qualifications:

- Post Graduate Certificate in Education (PGCE) (2003): Sheffield Hallam University
- C&G 7307 (2001), Adult Education Teachers Cert., Dearne Valley College, S. Yorks

Other Professional Qualifications and Activities:

- Director of Metal Metropol Ltd.
- Fellow (FIMMM) of IOM3 (Institute of Materials, Minerals and Mining)
- Fellow of RSS (Royal Statistical Society)

Work Experience:

- Over 25 years in coatings and steel related R&D at USA and UK universities, including 20 years at Swinden Technology Centre (R&D labs of British Steel, Corus and Tata Steel)
- 4 years at the University of Sheffield and AMRC Training Centre, developing and building CPD materials related training courses
- 7 years as technical advisor at British Stainless Steel Association including, building and delivering training courses in stainless steel and corrosion





Module Synopsis

This module provides an extensive overview of the complex factors impacting maritime structures, vessels, and offshore installations. The module categorizes marine zones, including atmospheric, splash, tidal, submerged, and seabed environments, analysing their impact on metal degradation. It explores atmospheric corrosion processes, emphasizing the role of humidity, pollutants, and climatic conditions in accelerating metal deterioration. A significant portion is dedicated to seawater chemistry and its influence on corrosion, covering salinity, dissolved oxygen, temperature, pH, and biological activity. Forms of corrosion such as galvanic, crevice, and pitting corrosion are examined together with protection strategies using coatings and cathodic protection.

Meteorology and oceanography fundamentals are introduced, explaining wave formation, movement, and interactions, such as refraction and interference, which affect vessel design and offshore structures. Wind-generated waves, deep-water and shallow-water waves, and their effects on marine engineering are discussed.

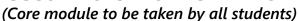
The module also considers marine pollution, highlighting sources such as plastics, oil spills, ship emissions, and ballast water discharge. The impact of nitrogen and phosphorus pollution on marine ecosystems is discussed, along with regulatory efforts intended to mitigate environmental damage.

Designed for marine surveyors, engineers, environmental scientists, and offshore industry professionals, this module provides essential knowledge to optimize material selection, prevent corrosion and understand the broader environmental challenges impacting maritime operations.

Learning Objectives

- Consider the effects that different marine zones have on material degradation and understand the implications for vessel and offshore structure longevity.
- Explain the chemical and physical properties of seawater that influence corrosion rates and metal performance.
- **Understand wave dynamics and their impact** on vessel stability, offshore platforms, and coastal structures.
- Be aware of marine pollution sources and appreciate their environmental consequences, including regulatory frameworks used for mitigation.
- Know how to exploit corrosion prevention techniques, including coatings, cathodic protection, and material selection, to enhance structural durability.

Ferrous and Non-Ferrous Alloys Used in the Marine Environment





Module Synopsis

This module provides an extensive exploration of the various metallic materials employed in shipbuilding, smaller vessels and offshore structures. It begins by classifying ferrous alloys, including carbon steels, stainless steels, and high-strength low-alloy (HSLA) steels, detailing their properties, applications, and production processes. An in-depth look at steel processing covers deoxidation methods, heat treatment techniques, and the impact of microstructure on material performance.

The module also examines non-ferrous alloys such as aluminium, copper, and nickel alloys, emphasizing their advantages in corrosion resistance, strength-to-weight ratio, and marine applications. Special attention is given to corrosion-resistant materials, including duplex stainless steels and corrosion-resistant copper-nickel alloys, which are essential for marine environments.

Additionally, the module explores cast iron classifications, including ductile and gray iron, and their specific uses in marine components. It addresses the mechanical properties, manufacturing considerations, and the performance challenges that these alloys are exposed to under harsh marine conditions.

This module is essential for surveyors, naval architects, marine engineers, and material scientists, equipping them with critical knowledge for material selection, corrosion prevention, and alloy performance optimization in maritime applications.

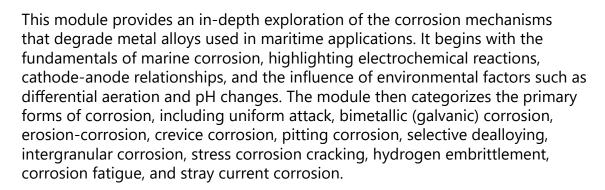
Learning Objectives

- **Differentiate between ferrous and non-ferrous alloys** used in marine environments, including their classifications and applications.
- **Understand steel processing techniques**, including heat treatment, deoxidation, and finishing methods, designed to enhance material performance.
- Assess the corrosion resistance of various marine alloys, including stainless steels, aluminium, and copper-nickel alloys.
- Appreciate the mechanical properties of cast iron and its applications in marine engineering.
- Apply knowledge of material selection and corrosion prevention strategies to optimize structural integrity and longevity in maritime applications.

Forms of Corrosion Affecting Metals Used in the Marine Environment

(Core module to be taken by all students)

Module Synopsis



Additionally, the module examines the corrosion resistance of various ferrous and non-ferrous metals used in marine environments, including mild steel, cast iron, stainless steel, copper alloys, aluminium alloys, and nickel alloys. The impact of different marine exposure zones - marine atmosphere, splash zone, submerged conditions, and polluted seawater - on metal degradation is thoroughly discussed. Protective measures to mitigate corrosion risks and enhance structural durability such as cathodic protection, coatings, material selection, and proper fabrication techniques are also discussed and contrasted.

By combining theoretical insights with real-world case studies, this module is essential for surveyors, naval architects, marine engineers, and offshore industry professionals seeking to understand and combat corrosion in marine structures.

Learning Objectives

On successful completion of this module, learners will be able to:

• Identify and explain the primary forms of corrosion affecting metals in marine environments.

• Understand the fundamentals of electrochemical corrosion mechanisms and the role of cathode-anode interactions in metal degradation.

 Assess the corrosion resistance of different ferrous and non-ferrous alloys used in maritime applications.

• Evaluate environmental factors such as salinity, pH, and aeration that influence corrosion rates.

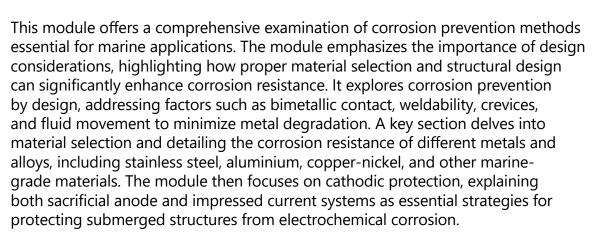
 Apply corrosion prevention and mitigation techniques, including coatings, cathodic protection, and proper material selection.



Corrosion Control Strategies for Metals Used in the Marine Environment

(Core module to be taken by all students)

Module Synopsis



Corrosion inhibitors are examined in depth, detailing their mechanisms, classifications, and applications in cooling systems, oil and gas pipelines, and potable water systems. The module also covers coatings and protective layers, ranging from organic coatings and metallic coatings to specialized paint systems like zinc-rich primers, which provide extended protection against harsh marine conditions.

By integrating theoretical concepts with practical applications, this module is ideal for surveyors, marine engineers, naval architects, and offshore industry professionals. It equips learners with the knowledge necessary to develop effective corrosion prevention strategies, ensuring structural longevity and operational efficiency in marine environments.

Learning Objectives

On successful completion of this module, learners will be able to:

• **Understand corrosion prevention by design**, including material selection, joint configuration, and structural considerations.

• Assess the merits of cathodic protection methods, including sacrificial anode and impressed current systems for specific marine situations.

• Evaluate the role of corrosion inhibitors and their applications in different marine systems.

 Differentiate between protective coatings, including organic, metallic, and conversion coatings.

• Apply best practices in corrosion management to enhance the durability of marine structures.



Shipbuilding: Types, Structure, Strength, Stability and Corrosion Control

(Obligatory for commercial ship surveyors to study)



This module explores various ship types, including passenger ships, container vessels, cargo ships, and specialized carriers like LNG and bulk carriers, offering insights into their structure, design, and regulatory requirements. The module then delves into ship structures, highlighting keel and bottom structures, bending stresses, and transverse forces that impact vessel integrity. Stability principles, including flotation mechanics, metacentric height, and hydrostatic curves, are examined to enhance understanding of how ships maintain equilibrium at sea.

Additionally, the module addresses the critical topic of corrosion control, introducing protective strategies such as cathodic protection, impressed current systems, and advanced coating technologies to ensure vessel longevity and operational efficiency.

By integrating theoretical knowledge with practical applications, this module equips learners with the expertise needed to understand the interrelationships between ship architecture, strength, and maintenance against environmental challenges.

The module ensures a well-rounded grasp of fundamental shipbuilding concepts and corrosion mitigation strategies making it ideal for surveyors, marine engineers, naval architects, and other maritime professionals.

Learning Objectives

On successfully completing this module, learners will be able to:

• **Identify and classify different types of ships** based on their design, function, and regulatory compliance.

• Analyse ship structures and strength principles, including keel and bottom structures, bending moments, and shear forces.

• Explain ship stability concepts, such as flotation principles, metacentric height, and the effect of free surfaces on stability.

• **Evaluate corrosion control techniques**, including cathodic protection, antifouling systems, and protective coatings.

 Apply knowledge of shipbuilding materials and structural integrity to enhance ship longevity and operational safety.



Shipbuilding: Steel, Aluminium Processing, Shipyard Practices & Testing

(Optional module but strongly recommended for commercial ship surveyors)



Module Synopsis

This module provides an in-depth exploration of ship construction, focusing on material processing, modern shipyard practices, and quality control testing. The module begins by describing typical shipyard layouts, illustrating the transition from traditional riverside shipyards to modern, large-scale facilities with optimized production flows. It then delves into steel and aluminium production, detailing refining processes such as the open-hearth method, electric arc furnaces, and the Hall-Héroult process for aluminium extraction. The importance of heat treatments like annealing, quenching, and tempering is emphasized to enhance the mechanical properties of shipbuilding materials.

Welding and cutting processes are extensively covered, with a focus on gas welding, electric arc welding (MIG, TIG, and submerged arc), and advanced cutting techniques like laser and water jet cutting. Ship assembly practices, including block and unit construction, illustrate the efficiency gains achieved through modular building techniques. The module also addresses quality assurance through non-destructive testing (NDT) and mechanical testing of hull materials to ensure compliance with classification society standards.

By integrating material science, fabrication methods, and testing protocols, this module equips learners with essential knowledge of modern shipbuilding techniques. It is particularly beneficial for surveyors, maritime engineers, shipbuilders, and quality control professionals aiming to enhance their expertise in ship construction and material integrity.

Learning Objectives

On successfully completing this module, learners will be able to:

• Explain the processes involved in steel and aluminium production and their significance in shipbuilding.

• Compare and contrast different welding and cutting techniques used in modern ship construction.

• **Describe ship assembly practices** including modular construction, block assembly, and prefabrication techniques.

• Evaluate non-destructive and mechanical testing methods used to ensure structural integrity and compliance with industry standards.

• Understand modern shipyard layouts and production flow to optimize efficiency in ship construction.

Off-Shore Oil & Gas and, WTG Platforms: Types, Structure, Strength, Stability and Corrosion Control

(Optional module but strongly recommended for commercial ship surveyors)

Module Synopsis

This module provides an in-depth exploration of offshore structural engineering, with a focus on oil and gas platforms and offshore wind turbine generators. Beginning with a historical overview, the module details the evolution of offshore structures from early wooden platforms to modern fixed and floating installations. It categorizes various platform types, including drilling, production, and auxiliary platforms, alongside advanced floating structures such as Floating Production, Storage, and Offloading (FPSO) units and tension-leg platforms.

The module also examines the forces affecting offshore structures, including gravity, wind, and wave loads, emphasizing the importance of robust design and material selection for long-term durability. A significant portion is dedicated to offshore wind turbine foundations, discussing both fixed and floating designs, their engineering challenges, and future trends in renewable offshore energy.

A critical section covers corrosion mechanisms in offshore environments, including the impact of seawater on steel structures, and presents cathodic protection strategies -sacrificial anodes, impressed current systems, and hybrid approaches. Protective coatings, corrosion inhibitors, and material selection are also explored to enhance structural longevity.

By integrating structural analysis, material science, and environmental considerations, this module is ideal for engineers, marine professionals, and renewable energy specialists seeking to understand offshore platform design, operational challenges, and maintenance strategies.

Learning Objectives

- Classify different offshore platform types and their functions in oil, gas, and wind energy applications.
- Perform simple calculation on structural loads and stability requirements for both fixed and floating offshore installations.
- Contrast wind turbine foundation technologies, including fixed and floating structures, for offshore applications.
- Assess corrosion risks and mitigation strategies, including cathodic protection and protective coatings.
- Understand future trends and technological advancements shaping the offshore energy industry.







This module provides a comprehensive guide to yacht and workboat design, construction, and performance. Covering small leisure yachts under 24m, superyachts, and aluminium workboats, it explores critical aspects such as hull geometry, hydrodynamics, stability at different heel angles, and keel and rudder dynamics.

The module delves into sail aerodynamics, mast interference, and streamlining, providing essential knowledge for optimizing performance. It also examines the evolution of superyachts over the past 20 years, including trends in sustainability, technological advancements, luxury amenities, and the growing charter market. The section on aluminium workboats focuses on their role in offshore wind farms, highlighting the advantages of aluminium alloys in marine applications. Construction methods, welding techniques, and comparisons between aluminium and steel vessels are explored in depth.

The final section addresses corrosion control, with a focus on cathodic protection methods such as sacrificial anodes and impressed current protection, alongside antifouling paint systems.

By integrating engineering principles with real-world applications, this module equips students with essential insights into modern yacht and workboat design, performance optimization, and long-term durability. Ideal for surveyors, naval architects, marine engineers, and maritime professionals, this module is designed to enhance understanding of advanced construction techniques and the evolving landscape of luxury and industrial vessel construction.

Module Scope & Content

- **Understand hull geometry and hydrodynamics** to evaluate vessel stability and resistance in various sea conditions.
- **Discuss keel, rudder, and sail performance** to optimize manoeuverability and efficiency in small yachts and workboats.
- Examine modern trends in superyacht design, including sustainability, technological innovations, and luxury features.
- **Compare aluminium and steel construction** in workboats, assessing material properties, welding methods, and structural integrity.
- **Apply corrosion control techniques**, including cathodic protection and antifouling systems, to enhance vessel longevity and performance.



Wood and GRP Vessels: Structure, Strength, Material Degradation and Corrosion Control Strategies

(Optional module but strongly recommended for yacht and small craft and narrowboat marine surveyors).

Module Synopsis

This module provides an in-depth examination of wooden and fiberglass-reinforced plastic (GRP) vessels, highlighting their construction, structural integrity, and long-term maintenance challenges. It covers the classification and properties of hardwoods and softwoods used in wooden boatbuilding, explaining optimal lumber specifications, fastenings, and best practices for durability. Traditional wooden construction methods, such as plank-on-frame, lapstrake, and strip-planking, are discussed alongside deck construction techniques, including traditional planked, canvas-covered, and plywood decks.

The module also covers in-depth GRP vessel construction, tracing its evolution from early fiberglass methods to modern manufacturing techniques like vacuum-bagging, hand layup, and chopper-gun application. It explores core materials, bonding techniques, and design considerations, emphasizing factors like avoiding "hard spots," proper gelcoat application, and structural reinforcement. A key focus is on material degradation and corrosion control strategies, addressing metal fastener corrosion in wooden vessels, delignification, osmosis in GRP hulls, and cathodic disbondment. The module details protective coatings, sealing methods, and modern caulking compounds to enhance vessel longevity.

By integrating traditional and modern boatbuilding knowledge, this module is ideal for surveyors, naval architects, marine engineers, and boatbuilders seeking to understand vessel construction, material selection, and corrosion prevention strategies for wooden and GRP vessels.

Learning Objectives

- Understand and apply the principles of wooden and GRP vessel construction, including material selection and best practices for durability.
- **Identify and evaluate the structural properties** of different wood types and their specific marine applications.
- Critically compare modern fiberglass manufacturing methods and their impact on vessel strength and longevity.
- Understand the mitigation strategies used to prevent common material degradation issues such as wood rot, metal fastener corrosion, cathodic disbondment and osmosis in GRP hulls.
- Implement effective maintenance and preservation strategies to enhance vessel integrity and extend operational lifespan.

Module 10 Failure analysis (Optional module)

Module Synopsis

This educational module provides a comprehensive understanding of failure mechanisms in maritime structures, components, and processes. It explores the principles and methodologies of failure investigation, emphasizing the importance of root cause analysis to prevent recurrence and improve engineering practices. The module begins by defining failure types, including physical failures (fractures, corrosion, wear), procedural failures (testing, maintenance errors), and systemic failures influenced by human factors or design flaws.

A structured approach to failure analysis is detailed, including problem-solving methodologies, failure investigation steps, and analytical techniques. The module outlines damage classification, differentiating between failure modes (fracture, fatigue, corrosion, creep) and underlying mechanisms (hydrogen embrittlement, stress-corrosion cracking, wear damage).

Advanced examination methods such as visual inspection, microscopic assessment, scanning electron microscopy (SEM), and spectroscopy techniques are explored to aid in damage interpretation. Corrosion and wear failure characteristics are examined alongside forensic techniques for root cause identification.

By integrating failure analysis theory with real-world case studies, this module is essential for marine engineers, naval architects, and material scientists, equipping them with the skills to diagnose failures, implement corrective actions, and enhance safety and reliability in marine operations.

Learning Objectives:

- **Understand the principles of failure analysis**, including root cause identification and structured problem-solving.
- Classify failure modes and mechanisms, such as fatigue, corrosion, creep, and mechanical wear.
- **Apply advanced examination techniques**, including SEM, spectroscopy, and metallography, to critically assess material failures.
- Evaluate the role of environmental and human factors in failures, including design flaws, testing errors, and maintenance issues.
- **Develop effective corrective actions** to mitigate failure risks and improve marine structural integrity.
- Appreciate the positive impact AI can have on risk assessment techniques (FTA, FMEA etc.) and the challenges that are associated with its implementation



Your investment in the Professional Qualification in Marine Corrosion

and the next step

The cost of the IIMS Professional Qualification in Marine Corrosion is £1,250.

This covers:

- Either immediate access to seven modules to be studied in your own time by video recorded delivery.
- Or attending live lectures (offered occasionally only).
- Resits, if required, are included.

You may start studying for the qualification immediately if you so wish. The course is available and offered through the IIMS On Demand Training Portal. You will be required to set up an account and pay online.

To access the IIMS On Demand Training Portal, go to https://bit.ly/4nyRXJa.

If you require further information, please email Vicki Loizides at education@iims.org.uk or call + 44 23 9238 5223.

> IIMS is an ISO 9001 accredited organisation with the scope of 'Training Services in Marine Surveying'.

