Overview of the role

The design and technical responsibility for the construction and maintenance of ships, boats, other marine vessels or offshore structures.

Standard in development
L6: Naval architect
Version 0.0

Title of occupation

Naval architect

UOS reference number

ST0897

Core and options

No

Level of occupation

Level 6

Occupational maps data

Route: Engineering and manufacturing
Pathway: Engineering, Design and Development
Cluster: Design and development engineer

Typical duration of apprenticeship

48 months

Degree apprenticeship

integrated degree

Target date for approval

31/12/2025

Resubmission

No

Would your proposed apprenticeship standard replace and existing framework?

No

Does professional recognition exist for the occupation?

Yes

Regulated occupation

Is this a statutory regulated occupation?

No

Occupational summary

This occupation is found in various small, medium and large organisations within the marine or maritime sectors. These could include government departments such as the Ministry of Defence, boat and ship builders or repairers, companies that construct and repair smaller vessels, ship design consultants, offshore constructors, ship survey or regulatory societies, classification societies, small commercial vessel certifying authorities, companies that maintain and repair naval submarines and ships, research organisations such as universities, port authorities, marine insurers, shipping companies, and maritime and coastguard agencies.

The broad purpose of the occupation is the design and technical responsibility for the construction and maintenance of ships, boats, other marine vessels or offshore structures, which could be recreational, civil or military. This includes assessing requirements, producing detailed designs, negotiating budgets, implementing test procedures, providing technical advice to assure compliance to maritime standards and communicating effectively with all stakeholders. A naval architect may work on a variety of vessels or offshore structures, including merchant ships - oil or gas tankers, cargo ships, cruise liners, passenger or vehicle ferries, warships, frigates, destroyers, aircraft carriers, amphibious ships, submarines and underwater vehicles, offshore drilling platforms, semi submersibles, Floating Production Storage and Offloading units (FPSOs); high speed craft, hovercraft, multi-hull ships, hydrofoil craft, workboats, fishing vessels, tugs, pilot vessels, rescue craft, yachts, power boats and other recreational craft.

In their daily work, an employee in this occupation interacts with many contacts and associates across a broad range of disciplines such as electrical and mechanical engineering, project management, finance, maintainers, ship and boat builders, vessel operators and crew, classification societies, flag state, shipyards, ship owners and charterers, insurers, customers, marine solicitors and equipment suppliers. They also interact with internal employees such as colleagues in finance, project managers, maintenance staff or engineers. The role is dynamic in terms of its location, which may be office-based at the start of a project with some on-site visits during construction,

repair and operation. Depending on the employer and project, naval architects may be required to work outdoors in close proximity to water, in enclosed spaces or at height.

An employee in this occupation will be responsible for ensuring that a safe, economic and seaworthy design is produced that satisfies the specification and design intent. In addition, they will be responsible for ensuring design intent is maintained through modification, maintenance, docking, repair, decommissioning, recycling and for improving vessel performance. Naval architects will reduce environmental impact through research, design and development, keeping up to date with and incorporating new and novel technologies. Naval architects may also be responsible for managing budgets, providing assurance and ensuring safety across all aspects of their role. Naval architects may support across all skills or specialise in certain skills, becoming experts in their chosen field such as structures, hydrodynamics or stability.

Typical job titles

Docking officer Dockmaster Hydrodynamicist Incline and stability officer Marine accident investigator Marine design engineer Marine designer Marine expert witness Maritime engineer Naval architect Salvage engineer Shipbuilding engineer Structural engineer Surveyor Yacht designer

Are there any statutory / regulatory or other typical entry requirements?

No

Occupation duties

Duty	KSBs
Duty 1 Carry out design project management, involving planning, resources, budgets, contracts, quality assurance, risk analysis and change management where appropriate.	K17 K18 K19 K20 K21 K22 K23 K25 K26 K27 K29 S1 S10 S11 S12 S14 S15 S16 S17 S18 S19 S20 S21 B1 B2 B3 B4 B5 B6 K3 K21 S4 S10 S11 B1 B2 B3 B4 B5 B6
Duty 2 Undertake hydrostatic and stability calculations.	

Duty	KSBs
Duty 3 Duty 3 Undertake resistance prediction calculations using industry standard methods, Computational Fluid Dynamics (CFD) calculation or scale model testing techniques and select appropriate marine propulsion systems.	K4 K21 S10 S11 B1 B2 B3 B4 B5 B6
Duty 4 Apply marine seakeeping and manoeuvring theory to marine vessels and structures.	K2 K5 K21 S6 S10 S11 B1 B2 B3 B4 B5 B6
Duty 5 Undertake weight control to the design, build and operational phases of marine vessels and structures.	K7 K10 K21 S7 S10 S11 B1 B2 B3 B4 B5 B6
Duty 6 Undertake structural design, calculation and substantiation of marine vessels and structures.	K6 K9 K13 K19 K21 S3 S8 S10 S11 B1 B2 B3 B4 B5 B6
Duty 7 Assess and produce requirements related to marine vessels and structures.	K1 K2 K3 K4 K5 K6 K7 K8 K9 K10 K11 K12 K14 K 18 K19 K21 K29 K30 S1 S2 S3 S4 S5 S6 S7 S10 S11 S15 S16 S19 B1 B2 B3 B4 B5 B6
Duty 8 Create concept, functional and preliminary level designs for marine vessels and structures using drawings, specifications and specialist computer software.	K2 K3 K4 K5 K6 K7 K8 K9 K11 K12 K13 K14 K15 K16 K17 K18 K19 K20 K21 K23 K24 K29 K30 K3 1 S1 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S13 S14 S15 S16 S17 S19 B1 B2 B3 B4 B5 B6

Duty	KSBs
Duty 9 Assess a design's performance in hydrostatics and stability, resistance and propulsion, seakeeping and manoeuvring.	K2 K10 K11 K13 K21 S5 S6 S10 S11 B1 B2 B3 B4 B5 B6
Duty 10 Produce detailed designs and production level drawings for marine vessels and structures using specialist computer software, generating 3D models, drawings, schematics, equipment or material specifications and component lists.	K2 K3 K4 K5 K6 K7 K8 K9 K10 K12 K13 K14 K15 K16 K17 K18 K19 K20 K21 K23 K24 K29 K30 K31 S1 S3 S4 S5 S6 S7 S8 S9 S10 S11 S12 S13 S14 S15 S16 S17 S19 B1 B2 B3 B4 B5 B6
Duty 11 Support vessels through life including maintenance, repairs, upgrades, refits, conversion, certification and decommissioning.	K2 K8 K11 K12 K13 K14 K15 K17 K18 K19 K20 K21 K29 K30 K31 S1 S6 S7 S10 S11 S12 S13 S14 S15 S16 S17 S19 S20 B1 B2 B3 B4 B5 B6
Duty 12 Produce and communicate technical information to meet the requirements of stakeholders.	K14 K16 K17 K20 K21 K24 K27 S18 S19 S20 S21 B1 B2 B3 B4 B5 B6
Duty 13 Provide technical advice to assure compliance and adherence to appropriate legislative, regulatory, national and international standards, classification society, safety and environmental requirements and standards.	K17 K18 K21 K22 K23 K24 K30 S12 S14 S15 S17 S18 S19 B1 B2 B3 B4 B5 B6
Duty 14 Maintain and enhance own personal, professional and technical competence.	K28 S22

Duty	KSBs
	B2 B4 B6 B7

KSBs

Knowledge

K1: The principles of assessing and producing requirements for naval architecture at the whole ship level or its systems, components, equipment, fixtures, fittings and materials, quality assurance, procurement process used during the design and manufacturing of marine vessels and structures.

K2: The types of marine vessels and structures and their application to the divergent range of uses, operations and requirements of marine vessels and structures: underwater vessels, naval ships, cargo vessels, offshore vessels, inshore and offshore structures, passenger vessels, recreational and sailing vessels.

K3: The theory, analysis, application and limits of hydrostatic and stability calculations, including hand, spreadsheet and marine software-based calculations, for example initial and large angle stability, upright hydrostatics, freeboard calculations, margin lines, buoyancy calculations, tank or compartment permeability, damage stability and inclining experiment.

K4: The theory, analysis, application and limits of resistance prediction calculations using industry standard methods, Computational Fluid Dynamics (CFD), or model and full scale resistance trials.

K5: The theory, analysis, application and limits of marine seakeeping and manoeuvring prediction software and model and full-scale manoeuvring trials.

K6: The theory, application, analysis and limits of marine structural assessments, design and calculation using engineering methods including hand calculations, spreadsheets, programming, Finite Element Analysis (FEA) software or Classification Rules applied to structural applications such as structural design loads including longitudinal strength, strength evaluation, materials, beams, girders, pillars, plates, midship section, stiffened panels; fracture control, structural vibration, hull deflection and welding.

K7: The impact of accurate weight estimation and control on whole vessel design, build and operational lifecycle.

K8: Design margins and their application during the design, build and operation of marine vessels and structures: volume, weight, scantling design, stability, powering, systems.

K9: The process of hull form and appendage design. Awareness of design drivers and the factors that may influence the selection of a particular hull form type.

K10: The different marine propulsions systems available and their application to differing operational requirements. Propulsion system components sizing, types of propulsion, propeller and propulsor design and sizing, thrusters, alternative fuel types and the integration into whole marine vessel and structures design.

K11: Awareness of electrical system design, component function and sizing, cable runs and the integration into whole marine vessel and structures design.

K12: Auxiliary systems and their application to the divergent range of uses, operations and requirements of marine vessels and structures, for example fuel storage and supply, bilge and ballast systems, hydraulic and air systems, fresh, grey and black waters systems, machinery heating and cooling, Heating Ventilation Air-Conditioning (HVAC), communications and control, corrosion prevention, external communications and navigation systems, fire prevention and suppression.

K13: Awareness of the requirements for mooring, anchoring, towing and docking and the processes of specifying procedures, equipment and layout.

K14: How general arrangements are developed and managed to ensure a coherent, practical and efficient integration of the systems required to satisfy the operational requirements.

K15: The implication of human factors on the design of marine vessels and structures.

K16: Types of naval architecture and engineering drawings, the process of developing 3D models, 2D drawing techniques, styles, nomenclature, and their standards and toolsets.

K17: Awareness of national and international standards and regulatory frameworks, including the role of statutory bodies and classification societies across the lifecycle of marine vessels and structures.

K18: The impact of sustainability and environmental efficiency and how they influence a design across its lifecycle.

K19: Principles of manufacture and construction of marine vessels and structures.

K20: Awareness of Systems Engineering approaches and processes, and the role of Systems Engineering in complex design projects to ensure an integrated design solution throughout the product lifecycle.

K21: Awareness of the different stages of the design maturity and product lifecycle, for example concept, basic, functional or detailed design, production, in-service support or decommissioning and recycling, recording decisions and assumptions made. The

design spiral, optimisation techniques and the need for governance in design development to achieve a balanced design.

K22: Approaches to quality assurance, quality control, non-destructive testing and associated standards.

K23: Awareness of safety and failure analysis techniques and the approach to safety case development.

K24: Naval architecture and marine engineering terminology. Techniques for the communication of technical information such as written specifications, drawings, reports and presentations.

K25: How engineering projects are organised and managed including the aspects of project management: planning, resources, budgets, contracts and quality assurance.

K26: Company structures and the differing functions that enable them to perform.

K27: Principles of diversity and inclusion: impact on others and policies and practices to support equity, diversity and inclusion.

K28: The importance of keeping up to date with advances in naval architecture, engineering and the marine industry and the differing methods of personal and professional development to achieve this.

K29: Research techniques used in development of the design and operation of marine vessels and structures.

K30: Principles and techniques of applying safety procedures, identifying hazards, undertaking risk assessments and taking corrective actions.

K31: Awareness of how costings are generated and their affect on whole ship design or its systems, components, equipment, fixtures, fittings and materials used during the design and manufacturing of marine vessels and structures.

Skills

S1: Undertake research, using techniques and sources in support of engineering development of the design and operation of marine vessels and structures.

S2: Undertake requirements capture and apply requirements to engineering tasks in the development and support of marine vessels and structures.

S3: Select hull or structural forms and develop hull form designs for a given specification. Apply fairing techniques using specialist hull design software and produce line plan drawings.

S4: Use hydrostatic and stability calculations to support design development, dockings, and through life management of marine vessels or structures.

S5: Use resistance prediction calculations to support design development and through life management of marine vessels or structures.

S6: Use seakeeping and manoeuvring predictions or trials to support design development and through life management of marine vessels or structures.

S7: Develop weight calculation tables, apply appropriate margins and manage weight control through the design, build and life of marine vessels and structures.

S8: Use structural calculations to support design development and through life management of marine vessels or structures.

S9: Produce engineering drawings and models in 2D and 3D using CAD software.

S10: Interpret and critically evaluate drawings, data and other qualitative and quantitative information and technical specifications.

S11: Analyse data using structured problem-solving and critical thinking to inform and substantiate engineering decisions.

S12: Apply regulatory and classification society requirements to the design of the marine vessels and structures such as structures, machinery, equipment or systems.

S13: Undertake cost vs capability assessments.

S14: Apply operational procedures and maintain compliance with technical specifications. Apply governance and quality assurance to design or engineering tasks including internal or customer design reviews.

S15: Incorporate environmental and sustainability requirements across the lifecycle of marine vessels and structures seeking to limit environmental impact.

S16: Undertake design and development activities across the lifecycle of marine vessels and structures.

S17: Apply safety procedures, identify hazards, undertake risk assessments and take corrective actions where required.

S18: Provide advice, assurance or guidance to stakeholders on naval architecture subject matter.

S19: Communicate technical information to stakeholders using methods such as written specifications, drawings, reports, presentations and meetings.

S20: Manage engineering projects, including planning, risks, resources, schedules, budgets and deliverables.

S21: Apply teamworking techniques, including conflict management and negotiation and principles of diversity, equality and inclusivity.

S22: Apply personal and professional development techniques to keep up to date with advances in naval architecture, engineering and the marine industry.

Behaviours

B1: Act as a role model and advocate for health and safety across the team.

B2: Act in a professional and ethical manner.

B3: Collaborate and promote teamwork across disciplines.

B4: Ability to innovate, adapt and be resilient to challenging or changing situations.

B5: Lead by example and advocate environmental and sustainable practices.

B6: Lead by example to promote accessibility, equality, diversity and inclusion.

B7: Commit to their own and support others' professional development.

Qualifications

English and maths

English and maths qualifications must be completed in line with the apprenticeship funding rules.

Does the apprenticeship need to include any mandated qualifications in addition to the above-mentioned English and maths qualifications?

Yes

Other mandatory qualifications

BSc or BEng in Naval Architecture that fully aligns with the KSBs within the apprenticeship standard.

Level: 6 (integrated degree)

Professional recognition

This standard partially aligns with the following professional recognition:

- Royal Institution of Naval Architects (RINA) for Incorporated Engineer (IEng)

This programme has been designed to align with the requirements of the engineering profession. This does not guarantee recognition by either the Engineering Council or the professional engineering institutions (PEIs) it licenses, unless the programme has been formally recognised (approved or accredited) by one or more PEIs and listed on the Engineering Council's recognised course search database which can be found on their website. Anyone seeking professional registration or further advice is advised to contact the appropriate PEI to discuss their application.

- Institute of Marine Engineering, Science & Technology (IMarEST) for Incorporated Engineer (IEng)

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Progression routes

ST0456 Post graduate engineer L7

Supporting uploads

Mandatory qualification uploads

Mandated degree evidence uploads

Professional body confirmation uploads

Involved employers

BAE Systems, Babcock, QinetiQ, Ministry of Defence, RNLI, Conrad Manning Racing, BMT

Other involved stakeholders

Subject sector area

4.1 Engineering