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A Guide to Marine Careers
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With 70% of the earth’s surface covered by oceans, and 90% of the world’s trade carried by ship, it’s hardly surprising that there are lots of related career opportunities, especially if you’re interested in engineering, science and technology! Our oceans and seas are of great importance – not only are they used for shipping, they are also important for sources of food, raw materials, energy and leisure.

Discover hidden depths

The IMarEST – Institute of Marine Engineering, Science and Technology – has produced this brochure to introduce you to some of the exciting careers available in marine engineering, science and technology. In particular, it looks at the professional engineers, trained scientists, skilled technicians and support workers who are needed in:
- Marine engineering
- Naval architecture
- Shipbuilding and boatbuilding
- Shiprepair and conversion
- Offshore engineering and technology
- Hydrographic surveying
- Ports
- Oceanography and marine meteorology
- Marine biology
- Diving or working with underwater vehicles
- Marine leisure
- Marine surveying

For each of the areas listed above, you can find out:
- what opportunities there are and what people do in their different jobs
- the skills and personal qualities you need
- entry, training and qualifications
- typical employers
- prospects for career progression.

You can also read what a few people working in these areas have to say about their careers.

Besides the maritime careers described in this brochure, there are many others too many to list here!

Reap the rewards in a marine career!

The marine environment offers a range of varied, challenging and fascinating careers. In many cases you’ll be working with cutting-edge science and technology. You could be in charge of the machinery on a cruise liner, making a significant contribution to designing a new ship, helping to protect an endangered species or developing sources of renewable energy! Marine engineering, science and technology careers offer excellent opportunities for specialisation and career development.

Pay very much depends on the nature of the job and the employer, but generally, salaries are very competitive. See page 36 for an idea of salaries in some of the career areas. Many employers offer a range of benefits, such as private health insurance for example.

Career opportunities all over the world

In the marine industry there are career opportunities all over the world. There are a growing number of interesting roles in the maritime sector of shipping and ship support, and in the marine environmental and research areas of marine science and operational oceanography. Useful websites for the UK are www.mntb.com, www.ukmarinealliance.com and www.seavision.org.uk

If you want to work for an employer overseas, generally, the relevant authority in the country where you want to work or study has the responsibility of recognising and accepting international qualifications.
You can get advice on the comparability of your qualifications by contacting various NARICs (National Recognition Information Centres) and ENIC (European Network of Information Centres).

If you are from overseas and want to work or study in the UK you can find out how your skills and qualifications compare with those in the UK either by contacting the IMarEST (see below) or UK NARIC. UK NARIC is the official information provider in the UK on the comparability of academic, vocational and professional qualifications from over 180 countries.

**UK NARIC** – Qualifications and Skills Division, Oriel House, Oriel Road, Cheltenham GL50 1XP. Tel: +44 (0)871 330 7033 www.naric.org.uk

The UK National Reference Point for Vocational Qualifications (UK NRP) is the agency responsible for evaluating international vocational qualifications for those from overseas.

**UK NRP** – address and telephone number as for UK NARIC.

If you are from the UK, have a vocational qualification and plan to work abroad, there are agencies that can help assess the comparability of your qualification. Agencies in the European NRP Network can be found on www.uknrp.org.uk

**If you plan to work in Europe...**

Europass is a collection of documents that record your skills and qualifications to make it easier to change employers and work in different European countries.

**UK National Europass Centre (UK NEC)** – address as for UK NARIC. Tel: +44 (0)871 330 8341 www.uknec.org.uk

**Make a splash – do something different!**

Don’t be put off a career idea because of other people’s stereotyped views of engineering, science and technology. For example, women are currently underrepresented in these areas, so there are all sorts of initiatives to help, such as taster courses and special career events. For information, see: www.wisecampaign.org.uk

**Sounds good?**

If you enjoy maths, biology, physics, geography, chemistry, electronics, computing, or geology, then you may well be suited to a marine career.

If you are interested in any of the careers described in this brochure, there are plenty of ways to find out more, such as:

- talking to your personal/careers adviser
- contacting the relevant organisations listed under the different career areas, or looking at their websites
- contacting the **Institute of Marine Engineering, Science and Technology (IMarEST)** – Aldgate House, 33 Aldgate High Street, London EC3N 1EN Tel: +44 (0)20 7382 2600. www.imarest.org
- using the information sources listed at the end of this brochure under ‘Choices, courses, cash and contacts...’.
How about MARINE ENGINEERING?

Marine engineers are responsible for the efficient, safe and environmentally clean operation of machinery and systems onboard a ship or a rig, and for the men and women in their charge. They are involved with the design, construction, installation, operation, maintenance and repair of the main propulsion engines and auxiliary machinery and systems found in all kinds of ships, boats and offshore installations. Depending on the job, they may also be responsible for everyone working in the engine room. Professional engineers are supported in their work by engineering technicians.

What does a marine engineer do?
Those operating at Incorporated and Chartered Engineer level ensure that engines and systems work efficiently and develop and deal with new and emerging technology. These professional engineers need management expertise in order to employ staff and operate plant efficiently and within the law for safety and environmental protection. Engineering Technicians deal with day-to-day engineering work, typically leading specialist teams.

In shipbuilding and marine engineering companies
Marine engineers work on engines and auxiliary equipment in the boatbuilding and shipbuilding industries and associated companies. A number of engineering disciplines – such as mechanical, electronic and structural – are involved. Marine engineers need to understand the effects of wind, waves and corrosion. Ships, boats, underwater structures, and the systems within them must be capable of operating in demanding conditions.

In merchant navies
Marine engineers employed by merchant shipping companies work on different kinds of vessels, from cruise ships to tankers. They are responsible for the operation and maintenance of the engines, as well as the electrical and electronic equipment. Engineering ratings undertake routine maintenance and repair work in the engine room, check instrument readings and operate controls.

Marine Electro-Technical Officers (METOs)
These specialist officers work within the engineering department where they take particular responsibility for the maintenance of onboard control engineering and electronic systems including propulsion control, radio communications and electronic navigation aids.

METOs have the opportunity to develop their careers along a professional electrical engineering path, perhaps leading to the rank of Chief Electro-Technical Officer, Chief Technical Officer or Electrical Superintendent (company dependent).

In defence navies
Naval vessels (such as those in the UK’s Royal Navy) ensure the safety of ports, sea lanes and offshore resources, as well as contributing to peacekeeping duties. Marine engineers and technicians serve in vessels such as frigates, minehunters, or aircraft carriers. Some work in submarines; although this option is not available for women at time of press.

In surveying
Marine surveyors are concerned with vessels – they look at their structure and design and may also be involved in the valuation of vessels for insurance or sale purposes. Technical surveyors work alongside marine surveyors, conducting routine work and providing assistance and specialist knowledge.
What skills and personal qualities do you need?

A marine engineer needs:
- an interest in maths, science and nautical matters
- practical and technical skills
- problem-solving ability
- a high level of numeracy
- teamwork and leadership skills
- for some jobs, to be prepared to work away from home for long periods.

What about entry, training and qualifications?

Incorporated and Chartered Engineers

To become an Incorporated or Chartered Marine Engineer, you normally start by taking a degree accredited by the IMarEST in a relevant subject, such as mechanical engineering, marine technology or ship science. For information on higher education entry requirements, see page 35. Other entry routes are available.

To gain ‘Incorporated Engineer’ or ‘Chartered Engineer’ status, after graduating, you need to follow a period of on-the-job learning before an assessment of your technical and managerial competence at a professional review. It is also possible to study marine engineering at postgraduate level although you will need an engineering or science based qualification first.

Craft and technician level work

- With a few suitable GCSEs, or equivalent, you can start craft training, learning on the job and at a college or firm’s training school, working towards NVQs. This may be through an Apprenticeship in marine engineering.
- With at least four GCSEs at grades A*-C, or equivalent – including English, maths and science – you can apply for engineering technician training, possibly through an Advanced apprenticeship, working towards an NVQ level 3. Alternatively, you could enter training after gaining a relevant qualification, such as a BTEC National qualification, through full-time study.
- To achieve ‘Engineering Technician’ status, you additionally need to complete a period of technical and managerial work experience.

Entry and training in the Merchant Navy

The main route into engineer officer training in the UK Merchant Navy is through a foundation degree in marine engineering – sponsorship is available through shipping companies. For entry, you need 120 UCAS Tariff points (see page 35) and at least four GCSEs at grades A*-B/C including English, maths and a physics or double-award science. The foundation degree takes at least three years and combines training at college and at sea. In addition, you get the Engineer Officer of the Watch Certificate which enables you to work on ships anywhere in the world. Other entry routes are available.
The recruitment of engineering ratings is more limited – contact shipping companies to enquire about training opportunities. Most shipping companies expect some GCSEs, or equivalent for entry. Training involves periods spent at college and training at sea. You work towards an NVQ level 2 in marine engineering or similar.

Entry and training in the UK’s Royal Navy

There are several routes of entry for engineer officers. All engineer officers are educated to degree level although entry is not restricted to graduates. There are various sponsorship, scholarship and bursary schemes to assist students at advanced level and at degree level. Officer training starts at the Britannia Royal Naval College, Dartmouth, followed by a further period of training at sea followed by specialist training at one of the two Royal Navy engineering training colleges.

Engineering Technicians can specialise in marine engineering or weapons engineering or on submarines. After initial naval

CASE STUDY

Neil Hodges is the Ship Systems & Propulsion Manager for the Submarine Support Management Group (SSMG). Neil has been employed by BMT Defence Services for 13 years, and has been seconded to his current position since 2011. Neil is based in Bristol, although he also visits other areas of the UK with his work.

How did you become interested in the marine environment?
I grew up in Cornwall and always enjoyed sailing and being near the water. At school I enjoyed science, maths and physics, so an engineering degree seemed like the obvious choice for me.

What was your entry route?
I took A levels in maths, physics and design technology, and then began an IMarEST accredited Marine Systems Technology degree at Plymouth University. After graduating in 1999, I joined BMT Defence Services, who specialise in independent naval engineering and design.

How has your career progressed so far?
At first I worked at the head office in Bath and was involved in many discrete engineering projects primarily in support of the MoD and Royal Navy (RN) surface ships and submarines. Typical projects included engineering feasibility studies, risk assessments, system and equipment design changes, and platform surveys. I was also involved in detailed studies for new naval ship designs.

After 3 years I was seconded to the SSGM as a Senior Platform Design Engineer. The SSGM provides engineering and design services support for the RN submarine fleet. I spent 3 years at the SSMG before moving to the Aircraft Carrier Alliance as the Weight Engineering Manager where I looked after the development of the weight and centre of gravity for the new RN aircraft carriers. After a period of 6 years I moved back to the SSMG as the Ship Systems and Propulsion Manager.

Whilst working for BMT Defence Services, I took an ILM level 4 Introductory Diploma in Management. I’ve also attended many different courses to build on the work skills I use on a day-to-day basis, including report writing, negotiating and presentation skills. In 2008 I achieved Chartered Engineer status through the IMarEST.

What are your main responsibilities/tasks?
I am responsible for a team of 10 engineers who provide project management, engineering and design services support to the in-service submarines section of the MoD. We work alongside the MoD to help maintain the in-service submarine flotilla by providing specific support in the mechanical/marine engineering area of submarine systems and propulsion. The team conduct the technical and project management aspects and I support their activities and certify their work. My responsibilities also include creating and fulfilling management processes that are necessary to ensure the efficient management and control of the team.

I am mainly office based but regularly visit the various dockyards to inform specific project activities.

What are the main qualities and skills you need to do your job?
Apart from an appropriate degree and on the job experience, it’s important to have good team and communication skills. Strong organisational skills and project management abilities are also useful, but these are all skills that you can develop whilst you are working. My secondments have definitely helped strengthen my abilities in these areas.

Where do you see your career heading?
I am very happy working for BMT Defence Services. I started as a graduate engineer and I am now a managing engineer; my wish is to continue advancing my career within the company. My current role continues to represent a positive challenge that keeps me motivated and interested, therefore I am content to continue in the field of in-service submarine support.

What do you enjoy most about your job?
I enjoy my work because it’s challenging. Different problems crop up daily and I enjoy the variety this creates. It is great working for a company with so many opportunities. BMT Defence Services has sister companies all over the world, so I may have the chance to relocate to another country.

Do you have any tips for someone considering a similar career to yours?
I think it’s important to take an accredited course. When I was looking into my next step after A levels, I didn’t realise how much an accredited degree would help me develop my career later on by making the road to chartership that much simpler. If I had not chosen an accredited degree, I would have had to have done further study and examinations. It’s definitely worth doing some research into the degree courses you’re interested in, and getting advice from the relevant professional body. I also think it’s important to work for a company who will support and encourage you to continue learning, so you can reach your full potential.
training, there’s a five-month period of specialist training onshore before continuing training at sea.

N.B. To work in a merchant navy and/or a defence navy, you would normally be expected to pass fitness and medical tests, have a certain standard of eyesight and be able to swim. There may also be age restrictions and other conditions of entry.

Who employs marine engineers?
Employers of marine engineers include:
- shipyards, boatyards and marinas
- marine engineering firms
- merchant navies
- defence navies, such as the Royal Navy
- the offshore oil and gas industries and mineral-extracting companies
- classification societies
- marine consultancies.

What about future prospects?
It is possible for officers in the Merchant Navy and Royal Navy to progress through the ranks, eventually to chief engineer/marine engine officer. There are routes for engineering ratings/technicians to qualify as officers or professional engineers. Once you are fully trained, there are career opportunities all over the world. Marine engineering skills can be adapted to other types of engineering.

Where can I find out more?
Careers at Sea –
tel: +44 (0)800 085 0973. Contact for a Merchant Navy information pack, including a list of sponsoring organisations.
www.careersatsea.org

Defence Engineering and Science Group –
tel: +44 (0)1225 449368. Offers a range of training and sponsorship schemes.
www.gov.uk/defence-engineering-and-science-group

Engineering Council –
tel: +44 (0)20 3206 0500 – contact for information on the standards required for Engineering Technician, Incorporated Engineer and Chartered Engineer status, or see:
www.enecc.org.uk

The International Marine Contractors Association –
tel: +44 (0)20 7824 5520
www.imca-int.com

The Institute of Marine Engineering, Science and Technology (IMarEST) –
tel: +44 (0)20 7382 2600
www.imarest.org

Royal Navy – tel: +44 (0)845 607 5555. Contact your local Armed Forces Careers Office.
www.royalnavy.mod.uk

SEMTA – the UK’s Sector Skills Council for science, engineering and manufacturing technologies –
tel: +44 (0)845 6439001
www.semta.org.uk

Society for Underwater Technology –
tel: +44 (0)20 3440 5535
www.sut.org.uk

CASE STUDY

Claudene Sharp is the Director of Vetting and Audits Europe & Asia for Phillips 66 Ltd. Claudene joined Phillips 66 Ltd last year but has been in the marine industry for over 20 years from Cadet to Chief Engineer and ashore. Claudene is based in London but has lived and worked globally.

How did you become interested in the marine environment?
My siblings and I were brought up at sea as my father is a Master Mariner and historically all the men in my family for generations went to sea. On our trips with our father he taught us the normal navigational things e.g. taking bearings and steering etc, but we were also sent down into the engine room.

During these periods in the engine room and growing up pulling apart marine diesel engines and auxiliary equipment I decided at 13 I would become a Marine Engineer.

What was your entry route?
Whilst at high school in Australia we have a compulsory period where we go out and work in our chosen fields doing work experience. I worked for 2 weeks with what was then the Maritime Water Board Sydney on the Sydney harbour tugs and ferries. After which I applied for a cadetship with shipping companies in Australia and obtained a cadetship with BHP Transport.

After I completed my cadetship with BHP Transport I came out of college with a degree in Marine Engineering and enough sea-time to obtain my Watchkeepers qualification. It was about this time that the Australian shipping industry collapsed and most of us went over seas to other shipping companies.

How has your career progressed so far?
I was fortunate enough to join Shell and then BP for 12 years. During my time with BP I obtained my further tickets cumulating in Combined Chief Engineer Motor and Steam (Oil and Gas). Again I was fortunate to have a mentor who not only saw potential in me, he also could have those difficult conversations with me.

I am now Director of Vetting and Audits for Europe and Asia with Phillips 66, an oil company.

What are your main responsibilities/tasks?
I look after marine risk management for the transportation of our cargoes to and from our berths in Europe and Asia/Pacific. I have a team in both regions that I manage.

What are the main qualities and skills you need to do your job?
The skills required include: management of people, understanding the industry, understanding the legislation governing our industry and being able to view and understand the risks inherent in order to mitigate them and provide a way to reduce or manage these.

Where do you see your career heading?
I have now worked in oil companies, in shipping companies and doing contract work for emergency response and training and salvage of distressed cargo. At this stage I am not sure where I would drive my career as I have been fortunate to already have extensive exposure and experience in so many areas.

What do you enjoy most about your job?
I have a great team of well experienced mariners which really makes the job. However the challenges of the trade and the industry and all the complexities provide me situations that I find motivating and enjoy.

Do you have any tips for someone considering a similar career to yours?
The only advice I would give is … just because you’re a marine engineer does not mean you cannot do anything else. Having engineering as a background means there are so many other areas that we can divert into and engineering – especially with seagoing experience – allows a great foundation for so many other opportunities ashore that provide a wealth of knowledge development and self-fulfilment.

Sea Your Future A Guide to Marine Careers
How about NAVAL ARCHITECTURE?

hips are extremely complex and highly valuable commodities. Naval architects are professional engineers who specialise in the design, construction, conversion, repair, surveying and decommissioning of ships, boats and offshore structures.

World trade, the leisure industry, offshore oil and gas and renewable energies and national defence of coastal waters and overseas interests, all mean that ships and boats of all types will continue to be required. New challenges, such as the need for environmental protection and security, also impact on vessel technology and design.

What does a naval architect do?
Naval architects are primarily involved in the design of vessels which move just above, on or under the sea. These include tankers, containerships, passenger ferries, warships, drilling platforms, submarines, hovercraft, yachts and other vessels – such as landing craft, diving support vessels and unmanned subsources.

Naval architects work on the safe, economic and seaworthy design of small boats and yachts as well as on commercial and military ships and submarines. They can specialise in construction/conversion, managing the whole process from the drawing board to the finished vessel. Their work includes planning the construction process, the supply of materials, fitting-out and testing. There are also specialised technical problems to be solved in areas such as cargo handling. Some naval architects advise on the repair and maintenance of fleets.

Certain organisations, such as classification societies, fleet owners and flag states, employ naval architects as ship surveyors. A ship is monitored during its design, construction and throughout its life to ensure that it is safe and seaworthy and meets other statutory rules and regulations. Naval architects, marine engineers and nautical surveyors often work together carrying out tests, surveys and procedures.

Naval architects may also work in research. There are also opportunities in rig fabrication and siting for the oil and gas industries.

Those operating at Chartered and Incorporated Engineer level in naval architecture usually have the most responsible jobs. They are involved with bringing in new technological innovations and advanced design and production methods and ensuring that existing technology works as efficiently as possible. Engineers usually also have managerial responsibility.

Engineering Technicians typically lead small, specialist teams in the detailed, ‘hands-on’ engineering work.

What skills and personal qualities do you need?
A naval architect needs:
- a broad understanding of different branches of engineering
- skills in computer-aided engineering and information technology
- a creative, logical and enquiring mind
- good communication skills
- the ability to lead and work in teams.

What about entry, training and qualifications?

Incorporated and Chartered Engineers
Fully-qualified naval architects are often members of the IMarEST and/or The Royal Institution of Naval Architects (RINA) and have a BEng or an MEng honours degree or equivalent in an approved engineering subject. A few universities offer degree courses specifically in naval architecture. For information on higher education entry...
requirements, see page 35. RINA and IMarEST accredit a number of degree courses in naval architecture, marine technology, offshore engineering and ship science.

After achieving a degree, you follow a period of structured training with an employer, which generally covers design, engineering practice and management services. This is followed by at least two years’ experience doing a responsible job in a chosen field of specialisation. Graduates whose degrees are not accredited by the IMarEST or RINA may still become members of these bodies, although checks on their academic qualifications may be necessary and additional training or experience may be required.

Amongst other organisations in the UK, Lloyd’s Register runs a training programme for graduates of naval architecture, and related subjects, to train as ship surveyors. In addition, it offers an undergraduate sponsorship programme. For details, see: http://careers.lr.org

The Defence Engineering and Science Group (part of the UK’s Ministry of Defence) offers undergraduate sponsorship and a scheme for graduates. For information, see: www.gov.uk/defence-engineering-and-science-group

**Engineering Technicians**

Entry requirements for trainee engineering technicians in naval architecture vary, but are usually four GCSEs at grades A*-C, including maths, science (preferably double award, or science and an additional science) and English. Trainees work towards a relevant NVQ or BTEC qualification. With sufficient skills and experience, you can apply for ‘Engineering Technician’ status.

**Who employs naval architects?**

Employers of naval architects include:

- shipbuilders and repairers and boatbuilders
- shipping companies
- marine design consultants/yacht designers
- government defence departments, such as the Ministry of Defence in the UK
- maritime and coastguard agencies
- marine equipment manufacturers
- classification societies
- research organisations, including universities
- companies operating in the offshore oil and gas industry.

**What about future prospects?**

It’s possible to start off as an Engineering Technician then become either an Incorporated or Chartered Engineer through extra study and training, and by developing technical and managerial competence.

Naval architects have a wide range of employment opportunities worldwide. Depending on their qualifications and personal interests, they may specialise in one field or develop broad experience in several areas.

With experience, it is possible for naval architects to gain promotion to senior technical and general management positions in industry, commerce and government. It’s also possible to move into another related area of engineering.

**Where can I find out more?**

**Engineering Council** –

tel: +44 (0)20 3206 0500 – contact for information on the standards required for Engineering Technician, Incorporated Engineer and Chartered Engineer status, or see: www.engc.org.uk

**The Institute of Marine Engineering, Science and Technology (IMarEST)** –

tel: +44 (0)20 7382 2600, or see: www.imarест.org

**The Royal Institution of Naval Architects (RINA)** –

tel: +44 (0)20 7235 4622.

For a description of the work of a naval architect and entry routes, view *Careers in Naval Architecture* on: www.rina.org.uk
How about **SHIPBUILDING** and **BOATBUILDING**?

**SHIPBUILDING** is the business of building large and small ocean-going vessels, usually of steel. Boatbuilding is the term used for the construction of smaller vessels from materials such as wood, steel, aluminium, glassfibre or new composite materials. There are opportunities in ship- and boatbuilding at every level.

- The worldwide *shipbuilding* industry has changed in recent years – dominance has moved from the West to the Far East – particularly South Korea and China. In the UK, there are currently a small number of shipyards engaged in building large ships. These may build specialist vessels such as chemical carriers, or, often, ships for the Royal Navy (the UK is a leader in warship production - an example being the **HMS Daring**, the first of a new generation of destroyers which, it is claimed, can defend the city of London from aircraft and missile attack single handedly!)* There are current contracts from the MOD to build two of the largest aircraft carriers in the EU by UK yards. There are also a number of smaller shipyards building smaller vessels such as tugs, ferries, fishing and survey/research vessels.

**Boatbuilders** construct boats typically up to about 50 metres in length – both boats for leisure (from luxury power boats to sailing dinghies) and small commercial craft. There are also manufacturers of marine equipment such as sails, engines, electronics and boat fittings. Most modern boats are made in a factory environment, but there are also some boatbuilders that build traditional wooden craft. Boatbuilding for the leisure industry is thriving.

**What opportunities are there?**
There are various levels of employment.

- There are many specialised **craft jobs**. Skills include welding, steel-cutting and bending, assembling sections, pipework, installing engines, plumbing, carpentry, boat-fitting, painting, rigging and sailmaking.
- **Technicians** are employed on such work as drafting, estimating, testing, quality control, building/manufacture, surveying and production control. Skilled technicians are also needed to install the sophisticated electrical and electronic systems in boats and ships – such as navigation systems and communications equipment.
- **Professional engineers** are highly-qualified people who design vessels, and may oversee their manufacture and production. Designers often specialise in a particular aspect of the design. Specialist interior designers are also needed.

Apart from the technical careers involved in designing and manufacturing, there are jobs within the industry in general management, project management, training, sales and marketing, purchasing and supply, accounts, and in administrative work.

**What skills and personal qualities do you need?**
A shipbuilder or boatbuilder needs:

- good practical skills
- problem-solving skills
- the ability to work accurately
- the ability to meet deadlines
- good teamworking skills.

**What about entry, training and qualifications?**

**Craft trainees**
Training is usually in the workplace, combined with a part-time college course or attendance at a company training centre, perhaps gaining NVQs. Good GCSE grades (or the equivalent) in maths and science are usually required for entry. Craft training in boatbuilding could lead towards a vocational qualification, such as a City & Guilds level 2 or 3 Certificate in Boatbuilding, Maintenance and Support. Apprenticeships are available with some shipbuilders and
boatbuilders. For some crafts, such as welding, plumbing and carpentry, it is possible to move into marine work after completing your initial training in a non-marine environment.

**Engineering technicians**
Craftsmen and women may move up to technician level by gaining qualifications such as an NVQ 3, BTEC National or a City & Guilds Certificate. Entry at trainee technician level is also possible with four good GCSEs, preferably including maths, science and english, or equivalent. Training may be through an Advanced Apprenticeship. A few colleges offer full-time BTEC National courses in marine engineering or related subjects. With experience and competence, appropriately qualified people can apply for ‘Engineering Technician’ status.

**Professional engineers**
Degree and foundation degree courses in marine technology/engineering are offered at a number of universities. Some are sandwich courses, offering work experience as part of the course. Degree qualifications, plus further training and work experience, can lead eventually to ‘Chartered Engineer’ or ‘Incorporated Engineer’ status.

Degrees that cover *yacht and small boat design* are offered by a small number of institutions. For information on relevant higher education courses, see higher education directories, websites/databases or visit the websites of the IMarEST, the British Marine Federation or the Royal Institution of Naval Architects. For general information on higher education entry requirements, see page 35.

**Who employs shipbuilders and boatbuilders?**
- **Shipyards** – you can find details of UK shipyards on the website of the Shipbuilders and Shiprepairers Association.
- **Boatyards** – in the UK, manufacture is carried out primarily in small- to medium-sized companies employing fewer than 50 people. Visit www.uksail.com for links to UK boatbuilders.
- **Specialist companies** making engines, sails, fittings, electronics and other specialist marine components.

**What about future prospects?**
Promotion prospects depend on the nature and size of the employer. With the right experience and skills, in boatbuilding, there are some opportunities to be self-employed or to start up your own business.

**Where can I find out more?**
- **British Marine Federation** – tel: +44 (0)1784 473377 for careers information can be found from: www.britishmarine.co.uk
- **Engineering Council** – tel: +44 (0)20 3206 0500 – contact for information on the standards required for Engineering Technician, Incorporated Engineer and Chartered Engineer status, or see: www.engc.org.uk
- **SEMTA** – the UK’s Sector Skills Council for science, engineering and manufacturing technologies – learning helpline: +44 (0)845 6439001. www.semta.org.uk
- **Shipbuilders and Shiprepairers Association** –
tel: +44 (0)191 5678965 fax: +44 (0)191 5100082
e-mail: office@ssa.org.uk www.ssa.org.uk
- **The Institute of Marine Engineering, Science and Technology (IMarEST)** – tel: +44 (0)20 7382 2600
www.imarest.org
- **Royal Institution of Naval Architects (RINA)** –
tel: +44 (0)20 7235 4622. Read about naval architecture on page 8 of this brochure. www.rina.org.uk
IIf you are thinking about a career in shipbuilding, you may easily overlook the opportunities presented in the ship maintenance, repair and conversion industry. UK is still a key destination for shiprepair and conversion and has a number of large and small yards dotted across the country. UK yards not only provide ship maintenance facilities but specialise in major conversion projects.

Ship conversion is often carried out as an alternative to building a new vessel, particularly in certain industry sectors, such as offshore oil, gas and mineral exploration. Europe is the world leader in conversion work, with about 40% of the global market.

What opportunities are there?
The employment opportunities are similar to those described for shipbuilding on page 10, with opportunities at craft, technician and professional level. So at craft level, in shiprepair and conversion, the work requires the skills of steelworkers, welders, joiners and carpenters, plumbers, painters and electricians. At professional level, the skills of mechanical, electrical and electronic engineers, marine engineers and naval architects are all needed.

What skills and personal qualities do you need?
The skills and qualities needed for shiprepair and conversion work is the same as for shipbuilding – see page 10.

What about entry, training and qualifications?
Entry, training and qualifications are also as described for shipbuilding on page 10.

Who are the employers?
The main employers are shipyards that specialise in repair and conversion work. The website of the Shipbuilders and Shiprepairers Association carries a ‘find a shipyard’ facility for the UK, which gives a brief outline of the range of work undertaken by each company.

What about future prospects?
Promotion prospects depend on the nature and size of the employer. Prospects for the industry as a whole are currently good.

Where can I find out more?
Shipbuilders and Shiprepairers Association –
tel: +44 (0)191 5678965
fax: +44 (0)191 5100082
email: office@ssa.org.uk
www.ssa.org.uk
CASE STUDY

How did you become interested in the marine environment?
I have always been interested in engineering and from a young age I was fascinated by ships. After completion of my Highers I began looking at university prospectuses to find a suitable course for further study at university. While there were many engineering degrees available it was certainly “Naval Architecture and Marine Engineering” which stuck out the most for me.

What was your entry route?
I studied a BEng in Naval Architecture and Marine Engineering, a joint course between the Universities of Glasgow and Strathclyde University. While studying there I was also training as an engineering cadet during the summer months, spending one summer completing the college phase at Glasgow Nautical College and another summer in the North Sea as a cadet onboard a dive support vessel with Acergy UK.

How has your career progressed so far?
After deciding that I was not going to pursue a career at sea any further I managed to get a placement during my final summer with Malin Marine Consultants in Glasgow. I spent the summer there working on various engineering tasks for the shipment of the blocks of the UK’s new aircraft carriers. Malin Marine, amongst a consortium of companies, was responsible for transporting all of the blocks from various shipyards around the UK to Rosyth which was certainly very interesting work. While at Malin Marine Consultants I also put forward a proposal to the management to develop a new arm of the company looking at ballast water treatment systems and exhaust gas cleaning systems, which I subsequently graduated from university to spearhead. I also gained lots of experience on-site during various ship conversion projects, eventually developing into project management of some large scale projects.

After two years of developing this arm of the business under Malin Marine Consultants, we decided to start a stand alone company, aptly named Cleanship Solutions, to take further strides into these markets. I am currently general manager of Cleanship Solutions and manage all projects.

Chris McMenemy is General Manager at Cleanship Solutions Ltd. Chris is based in the company’s Glasgow office but regularly travels to retrofit projects taking place in the Middle East and China.

What are your main responsibilities/tasks?
My main roles is to continue to develop the company in the ballast water treatment and exhaust gas cleaning markets, dealing with existing and potential clients and handling all quotations and contractual aspects.

I also project manage all of our projects which involves a great deal of time both in the office and on site. Our projects tend to involve a great deal of in-house engineering using various software, as well as intensive on-site work with our project management and installation teams. Most recently we carried out a large retrofit project near Shanghai in China which involved our team being on site for 5 weeks.

What are the main qualities and skills you need to do your job?
A willingness to go out and meet new people and deal with the pressure of managing various aspects of projects, including client expectations. Dedication is certainly required when travelling a lot but the rewards are seeing projects completed successfully.

Where do you see your career heading?
Hopefully we will continue to grow our new company, building up our portfolio of clients and consequently taking on more staff. The opportunity to consecutively manage many projects via our own team would be excellent as would the increase in my own responsibility and role within our Group’s companies.

What do you enjoy most about your job?
I enjoy dealing with the various challenges involved in vessel retrofit projects; squeezing new equipment into existing ship engine rooms is not an easy task and certainly involves some thinking outside the box.

Do you have any tips for someone considering a similar career to yours?
The most important aspect is gaining as much experience as you can. Identify local marine based companies and offer yourself for any volunteer work, summer placements and work experience. Not only does this increase your own knowledge and confidence but also helps to build your own network of contacts which is important for future employment opportunities.
A career in marine surveying offers a challenging and varied occupation that can see the surveyor travelling extensively. Surveying is a multi-disciplined occupation requiring a wide range of skills. It is usually a second stage career, utilising the experience built up during training and the early years in whichever discipline has been originally chosen. There are opportunities for Naval Architects, Marine Engineers and Mariners. Surveyors are recruited from seagoing and shipyard environments, with some training opportunities for appropriate degree graduates.

What opportunities are there?
There is a shortage of skilled surveyors; the hiatus in training in the Merchant Navy since the late 70’s has led to a shortage of experienced Class 1 Mariners and Engineers who have traditionally progressed into the ranks of classification societies and independent consultancy companies. There are various training courses and diplomas available but there is still a need for experience. The term ‘surveying’ is a catch all for a multitude of tasks that require an equal number of skills. They include:
- Cargo surveying for quantity and condition of both wet and dry cargoes. Before loading or after discharge
- Towage surveys for disabled vessels, barges, platforms etc
- Condition surveys for ships, yachts and any marine structures
- On hire, off hire, bunker, pre load condition
- Damage surveys which can often lead to expert witness work assisting the courts.

What skills and personal qualities do you need?
First and foremost, the ability to write a clear, concise and accurate report that is configured to the client’s requirements. The report is your product and you are judged by that. Know the limits of your skills. An eye for detail and utilising your experience to the best effect. An analytical and enquiring approach to problems, being able to tie the various factors together to produce the solution. An understanding that facts can usually be interpreted in a number of ways. And developing the ability to never stop learning both whilst onboard ship and by keeping up to date with developments within the industry. Flexibility and a willingness to travel anywhere at short notice.

What about entry, training and qualifications?
Unfortunately, partly due to the myriad skills required there is no universally accepted formal Surveyors qualification. Attempts to address this have been made recently with a number of modular diploma courses on offer from reputable organisations, as yet they do not seem to have had much impact. People with the skills of Marine and Electrical Engineers, Naval Architects and Mariners are all required. A Class one Certificate of Competency or a marine degree is a good starting point.

Who are the employers?
- Independent consultancies
- Classification societies
- Flag state authorities
- Many experienced surveyors are self employed or work for small organisations based close to a port.

What about future prospects?
Classification societies, flag state organisations such as the MCA and larger consultancies offer a career progression from surveyor to senior, principal and then area manager. Given the shortage of skilled people prospects are good for the right candidates.

Where can I find out more?
The Society of Consulting Marine Engineers and Ship Surveyors
+44 (0)207 261 0869
The Institute of Marine Engineering Science and Technology (IMarEST)
+44 (0)20 7382 2600
The International Institute of Marine Surveying
+44 (0)23 9238 5223

All images provided by BCTQ
The offshore sector includes everything from oil and gas exploration and extraction, and telecoms and power cabling, to wind farms, wave power, and offshore minerals mining.

The offshore oil and gas industry is concerned with the recovery of crude oil and natural gas from beneath the seabed to meet the world’s energy needs. The industry uses innovative technology and techniques to find and extract oil and gas.

It involves the installation of platforms, seabed equipment and the laying of underwater pipelines for its transportation. It takes a high-tech, multi-disciplinary team effort. Engineers and scientists are needed to work both onshore and offshore. There are also jobs for skilled and semi-skilled workers. Running all the people offshore requires the same number ashore to manage, support and supply them.

Concern for the planet has led to improvements in extraction methods in order to reduce environmental impact and more opportunities to work in offshore renewable energy supply.

What opportunities are there?
There are three main areas of work in the offshore oil and gas industry.
- **Exploration** – conducting surveys and tests to find worthwhile reserves of oil and gas.
- **Field development** – deciding how to extract the fuel, setting up production facilities and drilling wells.
- **Production and maintenance** – operating and maintaining equipment. There are jobs offshore on support vessels, platforms and drilling platforms and onshore at terminals servicing the equipment and constructing new platforms.

There are also opportunities in engineering design, planning and project management.

Some of the jobs in drilling are described below.
- **Roustabouts** do the basic labouring jobs, such as loading and unloading supply ships and helicopters and general maintenance.
- **Roughnecks** carry out the manual work of the drilling operation.
- **Derrickmen** work high up on the derrick (or steel tower) under the driller’s direction.
- **Drillers** operate the drilling equipment and direct the work of the drilling crew.
- **Toolpushers** oversee operations and may run the whole drilling platform, making sure work goes smoothly and that materials and equipment are available. Assistants to toolpushers are often graduates gaining experience.
- **Mud loggers** are highly-trained geologists who are alert to signs of precious hydrocarbons during drilling.

Offshore installations also need production operatives, welders, electricians, mechanics, storekeepers, medical workers and cooks. There are also jobs for divers to maintain the platforms.

The vessels in the offshore fleet (construction, drilling, seismic, supply and floating production vessels) all need **deck** and **engineer officers**, as well as crew. Some vessels and platforms can have hundreds of people onboard, so they need lots of facilities and services.

**Graduate jobs**
Scientists and engineers mostly work in labs or offices onshore, but they may spend occasional spells on offshore installations.

**Geologists/geophysicists** study underground structures using computers.
and analysing data from seismic surveys to assess the prospects of finding oil or gas. They prepare reports, charts and presentations for the contracting company. They may also work as mud loggers. **Petroleum engineers** apply principles of maths, physics, chemistry and engineering to the recovery and processing of hydrocarbons. **Drilling engineers** are responsible for the safe and efficient development, management and maintenance of drilling. **Reservoir engineers** work out systems to ensure that every last drop of oil is recovered from the reservoirs. **Subsea engineers** design, install, maintain and operate engineering equipment on the seabed. Subsea wells and processing systems must be installed at depths using remotely-operated equipment. **Pipeline engineers** are involved in the installation and maintenance of rigid and flexible oil and gas pipes. Where there are no pipelines taking products ashore, floating production, storage and offloading vessels are used to process the oil from the wells and transport it to export pipelines or shuttle tankers. **Structural engineers, naval architects and project managers** design, plan and manage the construction, installation, operation and maintenance of offshore platforms and vessels. **Deck and engineer officers** run the vessels in the offshore fleet.

Graduate engineers and scientists are also involved in new challenges, such as harnessing sustainable energy from wind, waves and currents. Equipment has to be designed, built, installed and operated safely and cost-effectively. You may find yourself working on exciting new projects, such as wave power energy generators.

**What skills and personal qualities do you need?**

To work offshore, you need:
- to be fit and strong (for manual work)
- to be reliable, responsible and very safety-conscious
- to be prepared to work outside in all weathers
- excellent teamworking skills
- for some jobs, leadership and project-management skills
- to be prepared to work on a shift basis and to cope with periods away from home.

Offshore engineers need a broad knowledge of engineering, including structural design, materials technology, fluid dynamics and control systems.

**What about entry, training and qualifications?**

Before working offshore, you have to undergo an offshore survival course, this will be provided by an employer. Once employed, workers receive further safety training and, if appropriate, training in firefighting. The minimum age for working on an offshore installation is 18. Basic offshore labouring work usually requires no formal qualifications, but relevant craft or technician experience or training helps. **Advanced Apprenticeships for technicians are available. These involve around 18 months’ training onshore, then 2 years’ training at an offshore or onshore oil and gas facility. Applicants need at least four GCSEs grades A*-C, or equivalent, including English, maths and a scientific/technological subject. Apprentices work towards a relevant NVQ level 3 and an HNC.**

Most engineers and scientists have degrees in a branch of engineering, chemistry, physics, maths, geology or geophysics. For higher education entry requirements, see page 35. It is possible to take a more specialist course, especially at postgraduate level. For instance, there are postgraduate courses accredited by the IMarEST in offshore, pipeline and subsea engineering and in renewable energy. Check that the course you are considering is suitable for the career you have in mind. Further training is usually on the job and through short courses.

**Chartered and Incorporated Engineer and Engineering Technician** status is available to suitably qualified, experienced and competent engineers via a number of professional bodies including the IMarEST and the Energy Institute. **Chartered Marine Scientist and Chartered Marine Technologist** status is available for other science and technology professionals via the IMarEST.
You can get an idea of the available opportunities in the oil and gas industry can be found on: www.ceg.org.uk. Information on offshore Apprenticeships can be found on: – tel: +44 (0)845 505 3535 www.subseauk.org, – tel: +44 (0)20 3440 5535 www.sut.org.uk, – Society for Underwater Technology, tel: +44 (0)20 3434 2020  www.sciencecouncil.co.uk, – The Science Council, tel: +44 (0)845 505 3535 www.subseauk.org, – The International Marine Contractors Association (IMCA), tel: +44 (0)20 7824 5520. Website has careers information, links to members around the world and lists approved training providers: www.imca-int.com/careers. Oil & Gas UK – the industry’s trade association – tel: +44 (0)20 7802 2400. Website has educational information and lists vacancies: www.oilandgas.org.uk

The Science Council – tel: +44 (0)20 3434 2020  www.sciencecouncil.co.uk

Society for Underwater Technology – tel: +44 (0)20 3440 5535 www.sut.org.uk

Subsea UK – tel: +44 (0)845 505 3535 www.subseauk.org

Information on offshore Apprenticeships can be found on: www.oilandgasteachers.com. Employment in the oil and gas industry has been going strong for decades and there is a wealth of engineering knowledge that needs to be passed on and learnt from. Willingness to learn is also an important skill and quality to have, especially for someone like me with a non-engineering background. The oil and gas industry has been going strong for decades and there is a wealth of engineering knowledge that needs to be passed on and learnt from. Where do you see your career heading? Only 2.5 years in... so I am not entirely sure! But one of the main attractions that I had to this industry was the opportunities to work in various countries around the world, so I am hoping one day I’ll be sat at my desk somewhere else in the world!

What do you enjoy most about your job? I enjoy working with lots of different people and having a variety of projects to get stuck in! There’s not a dull day in the office!

Do you have any tips for someone considering a similar career to yours? I think work experience is crucial, especially relevant to what you think you want to do. My first ever work experience was in an architect’s practice and although it was good fun, it made me realise a degree in architecture wasn’t for me. Thank goodness I did that work experience as it changed my decision on what to study and I have not looked back since!

Who are the typical employers?
Employers include:
- international oil and gas companies
- companies involved with renewable energy
- offshore contractors
- engineering design consultancies
- drilling, maintenance and specialist service contractors
- mud analyst firms
- suppliers of materials and equipment.

What about future prospects?
There’s a shortage of skilled workers in the industry. With the right experience, abilities and personality, promotion is possible at all levels. For instance, it could take just a few years to progress from a roughneck to driller. Apprentices usually progress to supervisory posts. Professional engineers may move into management positions.

Many countries want to harness their own supplies of energy, so there are opportunities to work almost anywhere in the world.

Where can I find out more?
Renewable UK – www.renewableuk.com
Cogent SSC – the UK’s Sector Skills Council for the industry. www.sciencecareerspathways.com
Energy Institute – tel: +44 (0)20 7467 7100  www.energyinst.org.uk
Engineering Council – tel: +44 (0)20 3206 0500 – contact for information on the standards required for Engineering Technician, Incorporated Engineer and Chartered Engineer status, or see: www.engc.org.uk
The Institute of Marine Engineering, Science and Technology (IMarEST) – tel: +44 (0)20 7382 2600. www.imarest.org
The International Marine Contractors Association (IMCA) – tel: +44 (0)20 7824 5520. Website has careers information, links to members around the world and lists approved training providers: www.imca-int.com/careers.
Oil & Gas UK – the industry’s trade association – tel: +44 (0)20 7802 2400. Website has educational information and lists vacancies: www.oilandgas.org.uk
The Science Council – tel: +44 (0)20 3434 2020  www.sciencecouncil.co.uk
Society for Underwater Technology – tel: +44 (0)20 3440 5535 www.sut.org.uk
Subsea UK – tel: +44 (0)845 505 3535 www.subseauk.org

Information on offshore Apprenticeships can be found on: www.oilandgasteachers.com. Careers information, including profiles of those working in the oil and gas industry can be found on: www.ceg.org.uk. You can get an idea of the available opportunities in the offshore oil and gas industry worldwide on: www.oilcareers.com
How about Offshore Renewable Energy?

The world has an abundant source of natural, clean power, derived from the wind, waves and tides. Unlike traditional fossil fuels, this energy will never run out. Renewable energy is essential for reducing the potentially devastating effects of climate change, and protecting the natural environment for future generations. Offshore renewable energy includes offshore wind, wave, and tide, where the strength of the wind, the pull and rise and fall of the tides, and the movement of waves, produces a vast amount of power that can be harnessed by modern technology.

What opportunities are there?
Opportunities exist all over the country, not just near the coast and many companies have offices overseas so there are opportunities for travel. There are a vast number of areas of employment from working outdoors at a renewables site, in a laboratory or in an office.

The employment opportunities in this area can best be described by the lifecycle of a marine renewable energy installation. These are:

Research & Design – People working in this area are usually scientists, mechanical engineers and electrical engineers or technicians. They are often working on innovative and exciting technologies. In addition, there are often roles for sales managers who can be dealing with sales of hundreds of millions of pounds worth of technical equipment.

Development and Consenting – A project developer leads the whole process and is normally one of the big energy utility companies seeking to build and operate a renewable energy site which might be an offshore wind farm, or an array of devices to capture energy from the tide or waves. Development managers work for these companies on areas such as site identification and consenting and licensing (getting the right permission to build the wind farm or install the tidal turbine). As part of the process, an Environmental Impact Assessment (EIA) is a requirement. This involves collecting and analysing all the necessary environmental information so the effect that the installation may have on the natural habitat and animals that live in, or use, the area can be understood. In addition, a developer needs to determine the effect of laying the electricity cables or installing an electricity substation and the effect that will have on the environment and on other users of the sea. Developers also need to know as much as they can about the site they want to use, including what the seabed looks like and consists of, so they know whether it’s a good place to put a turbine foundation for example. The developer also needs to collect information on the oceanographic conditions as they will affect construction and operation. For much of this work, developers use specialist consultancy companies that work on many different projects and employ lots of different people in different roles from Environmental Scientists to Oceanographers.

Technical Analysis – People working in this area often have advanced IT skills including those who develop software, carry out analysis of data, and use a number of specialist computer programmes. Technical analysis typically includes environmental analysis and marine science, and aerodynamicists (for wind turbines) or hydrodynamicists (for marine devices) are key at this stage to enable the development, construction and operation of offshore renewable energy facilities.

Construction and Installation – The construction and installation process includes a huge number of people with a variety of trade and technical skills including, for example, welders, pipe fitters, platters, electricians, mechanical fitters and riggers, and vessel operatives. Many of the skills involved are similar to those in the offshore oil and gas sector and many of the companies involved work in both sectors. Opportunities also exist for construction managers. This highly important job requires experience and involves being both office based but also spending time on installation vessels to check the project’s progress.

Operation and Maintenance – After many years of planning, construction and testing an offshore renewables installation is ready to produce electricity. At this point job opportunities exist for engineers and technicians to work on maintaining the infrastructure through the life of the equipment and site. There are also jobs for skippers of offshore vessels who ferry workers and equipment to and from the sites and for deck crew who assist in the operation of the work boats. Back on land, asset managers are responsible for the long-term health of the wind farm or other installations that their company owns. This role often involves the management of assets worth hundreds of millions of pounds.

What special skills do I need?
This is an exciting field perfect for adventurous people. If you work offshore you might need good sea legs and will need to be prepared to face wind, waves and rough weather. Fitness, stamina and a good head for heights can be important and being responsible and safety conscious are part of the job. However, don’t be put off if you don’t have any experience of working

Sea Your Future: A Guide to Marine Careers
offshore or at heights – there are training courses especially designed to train people working in this field. And, of course, there are also plenty of office and land based roles available.

What about entry requirements?
There are opportunities for both non-graduates and graduates in the offshore renewables sector. Roles in R&D often require specialist qualifications to PhD level. Roles in development and consenting often require graduate qualifications either in a specialist marine renewables course or in oceanography, hydrology, geology, marine biology or environmental science. Roles in manufacturing, technical sales, and asset and project management often require a strong technical background and usually a graduate qualification in an engineering discipline: either marine, mechanical, civil or electrical engineering. Other routes include through vocational qualifications such as HND and HNCs. Finally, as in other areas of manufacturing, your career can start straight from school or college with many companies running apprenticeship programmes. Apprentices need strong practical and technical skills with good GCSEs in science and maths.

Future prospects
Many governments are seeking to reduce their greenhouse gas emissions with wind, wave and tidal stream energy technology being used to decarbonise energy supply, increase energy security and reduce our dependence on fossil fuels. This means that the opportunities in this field are increasing. In the UK alone, over 500 companies engage in wind and marine energy related activities and activities in other countries are also growing in this area. Universities are developing specialist courses in marine and offshore renewable energy and many companies are developing apprenticeship and graduate training programmes.

Credit: This information is extracted from “Your career in offshore wind energy” published by the Crown Estate in association with Renewable UK and BVG Associates and from “Choosing a Career in Wind, Wave and Tidal Energy” published by Renewable UK.

Where can I find out more?
Renewable UK  Tel: +44 (0)20 7901 3000
Email info@renewableuk.com  www.renewableuk.com

The Crown Estate  Tel: +44 (0)20 7851 5000
Email enquiries@thecrownestate.co.uk  www.thecrownestate.co.uk

CASE STUDY
Emily Boram is a Marine Scientist in the offshore renewables team at RPS Energy. Emily is based in Woking, although she regularly visits client’s offices and attends consultation meetings, both in the UK and throughout Europe.

How did you become interested in the marine environment?
I have lived by the coast nearly all my life and loved spending my summers snorkelling, sailing and kayaking. As a result I became fascinated by the underwater world, the species that inhabited it and became conscious of the impact that man could have on this environment.

What was your entry route?
Following the completion of my degree in Marine Biology and Oceanography at the University of Southampton, I studied for a master’s degree in Environmental Diagnosis and Management at Royal Holloway. By this time, I knew I wanted a career in environmental consultancy and the key element of the masters was a four month industry placement.

How has your career progressed so far?
My first job at RPS was on secondment with a client. I was responsible for the environmental management of a 100 acre industrial site. Following this, I worked for the marine ecology team undertaking surveys (although I was a little sea sick at times) and data analysis for proposed developments. After a couple of years, I moved to the RPS offshore renewables team. I am currently an assistant project manager coordinatining the Environmental Impact Assessments for a Round 3 offshore wind farm.

What are your main responsibilities/tasks?
As an assistant project manager, I am responsible for the coordination and management of Environmental Statements. This includes liaising and working with a range of disciplines within the client organisation (including consents managers, engineers, legal advisors and senior managers), day to day management of specialist technical authors, undertaking consultation and working with stakeholders.

What are the main qualities and skills you need to do your job?
Although a background in environmental sciences is important, it is imperative that a project manager is organised, able to juggle a large number of different tasks and is an efficient and effective communicator. At times, the work can be stressful (especially near deadlines) so it is important to not get flustered under pressure.

Where do you see your career heading?
I would love to gain more experience on a variety of projects. There are fantastic opportunities as an environmental consultant to explore the world and hopefully I will be lucky enough to do so.

What do you enjoy most about your job?
I really enjoy working as part of an experienced team at RPS – it is a brilliant way to learn a huge amount. Having to work with different clients and stakeholders also increases my understanding of people’s concerns and demands on our environment.

Do you have any tips for someone considering a similar career to yours?
Wherever possible, undertake work placements to learn more about what you would like to do for a career and use this to identify an appropriate degree. It is important to remember that careers are not often a straight path and all the opportunities and different experiences you have along the way will only aid your development. Above all, you must have a passion and love for your subject as this really shows through in your work.
Hydrographers produce accurate plans and charts of the seabed. It’s vital to know about the shape and features of the seabed — for example, plans for new shipping routes need to take into account any large rocks and sand banks which could be hazardous, and engineers building offshore wind farms need to know if the seabed will support new structures.

What do hydrographers do?
Hydrographers (also known as hydrographic surveyors) use state-of-the-art technology to produce detailed charts of the seabed from the deep ocean floor to harbours, showing depths, shapes and contours. Some of the work involves geomatic surveying or geospatial engineering – collecting the precise information needed to draw up all kinds of detailed charts, maps and plans.

In order to carry out their work, hydrographers use sophisticated technology such as satellite-positioning systems, multibeam echo sounders and computer-aided design packages. The work usually involves periods onboard survey ships, drilling platforms and other vessels.

Hydrographers may be involved in gathering information for:
- predicting the effects of proposed developments on the environment, and of the environment on new and existing developments
- finding out whether channels used for shipping are being altered by silting or erosion, and if so, at what rate
- planning and monitoring dredging work to ensure safe navigation, or to allow new construction work
- exploring sites to extract minerals from the sea
- advising on the location for offshore wind turbines, oil platforms and subsea cables
- planning dock installations
- monitoring erosion on the seabed.

What skills and personal qualities do you need?
A hydrographer/hydrographic surveyor needs:
- to be familiar with computers and an enthusiasm for the latest technological developments
- practical problem-solving skills
- technical ability
- to be a logical thinker.

Patience and the ability to:
- maintain concentration
- a good head for figures
- financial and legal expertise (for some jobs).

What about entry, training and qualifications?
Most hydrographic surveyors have a degree in a relevant subject, such as geology, marine science or geography, followed by a postgraduate qualification in hydrography, geomatics or another specialist subject. Check that the
course you take is accredited by an appropriate professional body, such as the Royal Institution of Chartered Surveyors (RICS) or the IMarEST.

Higher education courses can be completed through full- or part-time study. In addition, to gain ‘Chartered status’, a period of structured training in employment leading to a professional assessment is required. The IMarEST now offers Chartered Marine Scientist and Chartered Marine Technologist status to suitably qualified, experienced and competent people.

A specialist higher education course will give you the key academic skills you need in the workplace. However, you’ll often gain the ability to use specialist technology and the basics of seamanship on the job, or through in-house training schemes. Most employers offer a thorough induction programme, which may incorporate the basic offshore safety training course needed to work at sea. Training opportunities are increasing in the case of hydrography and distance leaning is now a real opportunity.

Who employs hydrographers?
Employers of hydrographers/hydrographic surveyors include:
- port and harbour authorities
- contract surveying companies
- dredging companies
- defence navies, such as the Royal Navy
- organisations involved in land reclamation
- coastal protection agencies
- national charting agencies
- companies involved in offshore exploration
- pipe and cable laying firms.

What about future prospects?
It’s possible to gain promotion to senior status and management roles. Some experienced hydrographic surveyors are freelance, working on contract to various organisations, or become established up as consultants.

Although this is a small and specialist area of employment, as governments around the world look to develop greener sources of energy offshore, the need for hydrographers looks set to increase.

Where can I find out more?
The Hydrographic Society UK – tel: +44 (0)1752 223512
www.ths.org.uk
The Institute of Marine Engineering, Science and Technology (IMarEST) – tel: +44 (0)20 7382 2600
www.imarest.org
Institute of Materials, Minerals and Mining – tel: +44 (0)20 7451 7300
www.iom3.org
Chartered Institution of Civil Engineering Surveyors – tel: +44 (0)161 972 3100  www.cices.org
The International Marine Contractors Association – tel: +44 (0)20 7824 5520
www.imca-int.com
Royal Institution of Chartered Surveyors (RICS) – tel: +44 (0)870 333 1600
www.rics.org/careers
The Science Council – tel: +44 (0)20 3434 2020
www.sciencecouncil.co.uk
The Hydrographic Academy – www.plymouth.ac.uk/hydro

Careers information in the mining and minerals industries can be found at: www.uk-rocks.net
How about WORKING IN PORTS?

In Europe alone, over 1,000 ports handle more than 3.5 billion tonnes of cargo every year. Ports can be busy places and offer exciting opportunities in many different areas. Jobs in ports range from stevedores to harbour masters!

The size and function of a port will determine the number of employees – some of the largest employ over a thousand people. Ports:
- deal with imports and exports of raw materials and finished goods
- provide facilities for the fishing industry
- provide ferry and cruise ship terminals
- offer recreational facilities, such as yacht marinas.

What opportunities are there?
Ports are mechanised and cargo needs to be unloaded quickly and safely. Port workers need to be organised and efficient as vessels may be waiting to berth, and navigating in and out of the harbour will be affected by tides. With competition from airlines and road haulage companies, ports also have to be run economically. Each employee’s role contributes to the smooth operation of the port.

There are opportunities in technical work, administration, customs and management. Some of the jobs available in port operations are described below.

- **Marine/port operatives** – undertake various jobs on the water around the harbour/port area, such as moving navigational markers, positioning gangways, taking marine pilots out to ships, and possibly operating lock gates.
- **Passenger operatives** – work in ports that accommodate ferries and/or cruise ships. They control the movement of passengers (and passengers in vehicles) around the port area, and on and off the ferries/ships; they may also check tickets and deal with passengers’ queries.
- **Stevedores** – load and unload cargo; they may decide how to stack cargo in the best way or how to unload goods quickly and efficiently. They may have to drive different types of vehicles, or operate cranes, suction pipes and conveyor belts.
- **Vessel traffic services operatives** – work in the port control centre, controlling the safe movement of ships and boats around the port/harbour area. They use marine radar and communicate with vessels by VHF radio, radio telephone etc.
- **Marine pilots** – board vessels entering or leaving the port or harbour, and navigate them safely in and out avoiding submerged rocks and other hazards.
- **Harbour masters** – ensure that the port is safe for all the vessels using it. They monitor environmental standards and manage leisure craft activity within the harbour.
- **Engineers** – maintain and repair machinery and equipment within the port.
- **Port managers** – manage all aspects of the work of the port, including health and safety and port development and liaising with the organisations using the port, such as freight companies.

What skills and personal qualities do you need?
To work in ports you need:
- to be very safety-conscious
- teamworking and communication skills
- to be fit and healthy – some jobs require heavy lifting
- to be prepared to work irregular hours in some jobs
- language skills for some jobs.

What about entry, training and qualifications?
There are opportunities for people with different levels of qualification and experience. In many of the practical roles, such as stevedore or marine/port operative, no formal educational qualifications are required although GCSEs or equivalent in english, maths and science are always useful. The work can be very physical and involves being outside in all weathers. Previous experience of warehouse or transport services may be useful. Stevedores must have a driving licence. Experience of dealing with customers may be useful for passenger operatives. Training for all these positions is
usually on the job, and you may be able to work towards relevant qualifications.

NVQs are available in port operations and the supervision of port operations at levels 2 and 3 respectively. Port and Skills Safety is working on a number of training and qualification routes. Apprenticeships and foundation degrees are now available.

**Marine pilots** normally have considerable experience at sea, as deck officers for example. Entry requirements vary depending on the pilot authority but candidates will usually need a ship master’s certificate.

For jobs on the commercial and administration side, you may need GCSEs, A levels, or equivalent qualifications.

Large companies offer graduate management training schemes. The technical management of port facilities is usually carried out by people with some experience at sea, or with engineering qualifications and training. The IMarEST offers ‘Chartered status’ to suitably qualified, experienced and competent marine professionals.

**N.B.** In the UK (and some other countries), regulations mean that no one under the age of 18 is allowed to operate certain machinery, including some lifting appliances. So, for certain jobs, such as stevedoring, entry is from the age of 18.

**Who are the typical employers?**

Employers of ports workers include:
- port authorities
- ferry companies
- cruise line operators
- transport firms
- stevedoring companies
- freight forwarders
- warehouse operators
- shiprepair and maintenance companies.

**What about future prospects?**

On-the-job training and the right personal qualities can bring promotion to supervisory jobs or junior management positions for people in operational and technical roles.

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**Where can I find out more?**

- **British Ports Association** – tel: + 44 (0)207 260 1780
  www.britishports.org.uk
- **The Chartered Institute of Logistics and Transport (UK)** – tel: +44 (0)1536 740 100
  www.ciltuk.org.uk
- **The Institute of Marine Engineering, Science and Technology (IMarEST)** – tel: +44 (0)20 7382 2600
  www.imarest.org
- **Port Skills and Safety Ltd** – tel: +44 (0)207 260 1790
  www.portskillsandsafety.co.uk
- **United Kingdom Major Ports Group** – tel: +44 (0) 20 7260 1785
  www.ukmajorports.org.uk
Oceanography is the scientific study and description of the oceans. Oceanographers try to understand and predict how oceans work, and help us to use and conserve their resources.

Because the oceans and the atmosphere are linked, marine meteorology is a related area of expertise. Marine meteorologists provide ocean and weather observations and forecasts. For people who work at sea, or who live on the coast, such information can be vital!

What do oceanographers and marine meteorologists do?
Oceanography combines many different scientific disciplines. A range of professionals may contribute to any one piece of research. Oceanographers can specialise in the following areas:

- **physical oceanography** - studying the physical characteristics of the oceans such as temperature, and salt content (salinity), as well as tides, currents, waves and ocean circulation
- **chemical oceanography** - focusing on the chemical composition and properties of seawater and marine sediments, and the behaviour of pollutants
- **geological oceanography** - concerned with the seabed, its composition, structure and formation
- **biological oceanography** - studying the many life forms that live in the sea and how they interact with their surroundings.

A lot of an oceanographer’s work is laboratory- or desk-based and involves the use of computer modelling. Although much data comes from automated sampling equipment and satellites, time is still spent in the field, gathering data from instruments deep below the surface. Most oceanographers spend some time at sea on research or commercial vessels, possibly going down to the seabed, using diving equipment or submersibles.

Oceanography has practical applications in areas such as offshore oil and gas exploration and production, offshore renewable energy provision, fisheries, mineral extraction and shipping management.
Operational/applied oceanographers and marine meteorologists collect weather and ocean data from weather stations, satellites and observation vessels. They feed this into computers, interpret the output and produce and analyse charts. This is used to predict future sea state and weather conditions to inform a wide range of decision makers. This information can also be used to develop a record of past weather, from which calculations of large-scale changes in the global climate can be made.

In addition, these professionals are concerned with the practical use of meteorological and all oceanographic data. They use various ocean modelling systems for wave, storm surge and ocean current forecasting and increasingly ecological models to determine, for example, the potential for Harmful Algal Bloom development etc. This helps organisations such as ferry operators and oil and gas companies to plan their work and for governments to protect people who live at, work at and visit the coast. Predictions of conditions over seasons are also useful for government departments and many other organisations to make long term plans.

There are occasional opportunities for technical and support staff to undertake the more routine work in oceanography and marine meteorology.

What skills and personal qualities do you need?
An oceanographer or marine meteorologist needs:
- analytical skills
- to be observant, patient, accurate and able to pay attention to detail
- numerical skills
- problem-solving skills
- ICT skills
- the ability to work in a team
- good communication skills.
It is useful to have ability in another language.

What about entry, training and qualifications?
Oceanography is a career for graduates; most entrants also have postgraduate qualifications. A first degree in physics, chemistry, maths or biology, followed by a
Elaine Dickins is an Oceanographer working for Fugro GEOS, the world’s leading supplier of meteorological and oceanographic services for offshore and coastal engineering applications. Elaine is based in Wallingford where her work is predominantly office based with some opportunities to work offshore.

How did you become interested in the marine environment?
Science was my favourite subject at school and I’ve always loved being by the sea so a career as an oceanographer was an obvious choice. I was hooked on marine science since watching David Attenborough’s Blue Planet series when I was at school.

What was your entry route?
I did a degree in Marine Biology and Oceanography at the University of Wales, Bangor. Having really enjoyed the modules on waves, tides and physical processes, I then did an MSc in Oceanography at the University of Southampton where I tailored my course towards physical oceanography.

How has your career progressed so far?
After leaving Southampton, I went to work as an Oceanographer for Fugro GEOS where I manage meteorological and oceanographic (metocean) reporting contracts. I’ve recently completed my offshore training which enables me to work on rigs and research vessels deploying oceanographic equipment.

What are your main responsibilities/tasks?
My job involves the processing, analysis and reporting of measured and modelled data for measurement projects from around the world. A large part of my work involves the processing and quality control of metocean data and then putting together a report to present the information in a useful and accessible way for the client.
I also create current forecasts to help with offshore operations, and conduct desk studies (reviews of historical data) to provide a preliminary overview of wind, wave and current conditions in a region. I have recently begun managing my own projects and liaising with clients.

What are the main qualities and skills you need to do your job?
You need a good understanding of ocean processes (global and regional) along with being comfortable with statistics and able to communicate and explain ideas clearly to audiences with a range of backgrounds. Strong organisational skills are important, particularly when it comes to project management.

Where do you see your career heading?
I want to gain experience working offshore on a wide variety of projects and to continue improving my skills in project management. I also aim to become a Chartered Marine Scientist through the IMarEST.

What do you enjoy most about your job?
I enjoy the variety of work. Our projects come from all over the world so I’m improving my understanding of regional processes in a whole range of different areas, as well as becoming familiar with many different types of instrument. I’m looking forward to the opportunity to work offshore and to be involved in all stages of measurement projects, from collecting the data to delivering the final report.

Do you have any tips for someone considering a similar career to yours?
Pick a good course and one that gives you a chance to choose some modules, that way you can adapt to what you enjoy best. Gain as much experience as possible when you’re studying, there are often research cruises and projects you can get involved in if you ask. I would also recommend becoming actively involved in a professional body; they offer good networking opportunities that could lead to potential job contacts.
research institutes (such as those funded by the UK’s Natural Environment Research Council)
research teams at universities
national meteorological services, such as the Met Office in the UK which provides services to all kinds of public and private organisations
energy companies
companies in the water industry
marine survey and consulting companies
ocean instrumentation manufacturers
defence establishments
environmental consultancies.

What about future prospects?
Some posts are offered as contracts to work on a particular project for a fixed period of about three years. Experienced marine meteorologists may move into the increasing number of forecasting and consultative services.

Where can I find out more?
The Institute of Marine Engineering, Science and Technology (IMarEST) –
tel: +44 (0)207 382 2600  www.imarest.org
Met Office – tel: +44 (0)870 900 0100
Website carries information about career opportunities and vacancies.
www.metoffice.gov.uk
National Oceanography Centre, Southampton –
tel: +44 (0)23 8059 6666  www.noc.ac.uk
Natural Environment Research Council (NERC) –
tel: +44 (0)1793 411500  www.nerc.ac.uk
Royal Meteorological Society –
tel: +44 (0)118 956 8500
Website lists courses and gives career information: www.rmets.org
Society for Underwater Technology –
tel: +44 (0)20 34405535  www.sut.org.uk
University of Plymouth, Marine Institute –
tel: +44 (0)1752 600600
www.research.plymouth.ac.uk/marine

How did you become interested in the marine environment?
I enjoyed science at school and grew up by the sea. When I was applying for jobs after graduating, I was interested in a wide range of environment issues. My first job was at the Met Office where I started to learn about, and get interested in, the oceans.

What was your entry route?
After doing A levels in maths and physics, I took a degree in mathematics at the University of Newcastle Upon Tyne. I then went on to do a masters degree in mathematical modelling and numerical analysis at Oxford University. I applied for a general graduate entry job at the Met Office, and was offered a position working on sea ice in climate models.

How has your career progressed so far?
As mentioned above, my first job was working on the sea ice part of climate models at the Met Office. To help me with my work, I was given a lot of training – the Met Office sent me on courses about climate physics, oceanography and fluid dynamics. After a few years, I moved to University College London where I was responsible for establishing a numerical modelling capability for the study of sea ice at the Centre for Polar Observation and Modelling. This involved combining numerical models and satellite data.

What are the main qualities and skills you need to do your job?
To model the ocean using computers you need some understanding of the ocean and how computational models work. Maths and physics are as important as geography for this kind of work. The skills you need include:
- being able to interpret maps
- computer programming
- organisational ability
- the ability to explain things clearly to colleagues and clients.

Where do you see your career heading?
I hope to continue working in oceanography and increase my experience of modelling different processes – tides, sediment and marine ecosystems. Perhaps in the future I’ll try to get out to sea more often, although I do get a bit seasick!

What do you enjoy most about your job?
Every project is different, and I get to see a lot of the world...on paper at least!

Do you have any tips for someone considering a similar career to yours?
If you’re interested in this area of work, it’s important to pick a good course at a good university. Read around the subject and ask lots of questions. If you can, try to get out to sea. Aim to work on projects that interest you.

CASE STUDY

Doug Cresswell is a scientist specialising in wave modelling at HR Wallingford, an Oxfordshire based consultancy and research organisation. He works on projects for a wide range of clients looking at locations all around the world. His work is primarily office based, with occasional meetings, conferences and courses around the UK and Europe.

Doug Cresswell

How did you become interested in the marine environment?
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Do you have any tips for someone considering a similar career to yours?
If you’re interested in this area of work, it’s important to pick a good course at a good university. Read around the subject and ask lots of questions. If you can, try to get out to sea. Aim to work on projects that interest you.
How about MARINE BIOLOGY?

Marine biologists study the fascinating animal, plant and microscopic life in oceans. An estimated 80% of all life on earth is found under the ocean surface! Plants and animals act as indicators of the effect of human activities on the planet, including pollution and climate change. Marine biologists play a vital role in studying these changes.

What does a marine biologist do?

Marine biologists investigate all kinds of issues and problems. Here are some typical areas of concern:

- changes to biodiversity due to man-made operations or nature
- over fishing has led to a reduction of worldwide stocks of certain fish species
- pollution has contributed to the loss of coral
- the release of hot water and other effluents by various industries has altered the ecological balance of the oceans
- pollution has caused an increase in water-borne infections in humans
- the use of pesticides and artificial fertilisers in farming has had serious consequences on food chains
- chemicals can cause 'gender-bending' and fertility problems in fish, shellfish and other aquatic organisms.

On a positive note, marine biologists are able to address many of these problems. For instance, they are working for offshore renewable energy or oil and gas companies to reduce the potential impact of their operations on marine life. They are also involved in developing designated marine reserves and ecosystems in order to protect and enhance.

Concern for the marine environment and an interest in water-based leisure activities has made this area of applied biology a popular career choice. The opportunity of doing a job that involves outdoor work (perhaps including fieldwork at sea) is one attraction. But don’t be misled into thinking it’s a soft option as the work may involve lengthy, routine fieldwork and one field trip can generate many weeks of laboratory-based analysis. Obviously, the balance of time spent outdoors and in the lab varies from one job to another. Most jobs are in research, development and monitoring. This can be on a macro to micro scale. You could be involved in pure research – mapping what species are present in a particular area, for example, and trying to understand marine ecosystems. Or, you could work in applied research, using the results of pure research to solve practical problems and to aid industries based on marine life. There are also opportunities for consultancy work, for example, conducting environmental impact assessments, environmental audits or waste management studies on behalf of governments, oil companies and organisations involved in renewable energy, nuclear power etc. Laboratory assistants and IT technicians are part of the team that work with marine biologists.

What skills and personal qualities do you need?

A marine biologist needs:

- an affinity with the marine environment and an interest in aquatic life
- excellent numerical skills (particularly sought by employers)
- practical skills
- patience and good observation skills
- the ability to work in a team
- good written and oral communication skills
- to be prepared to work outdoors in all weathers – perhaps at sea.

What about entry, training and qualifications?

As mentioned, marine biology is a popular career choice and there are more people trying to work in the area than there are jobs available. It’s a really good idea to gain relevant experience as a volunteer as this will improve your prospects of finding a job. It may be helpful to join a Learned Society such as the Marine Biological Association www.mba.ac.uk as well as IMarEST.

Professional marine biologists

The usual requirement for professional posts in marine biological science is a degree in biology or biochemistry. It is also worth checking courses that offer ecology or environmental studies as options. However, it’s advisable to start with a broad-based degree as this may offer you more possible career options and will ensure that you get a good understanding of how biology ‘fits into’ your marine interests.

A relevant degree can be followed by a postgraduate degree specialising in marine biology – in fact, most jobs now ask for postgraduate qualifications.

Chartered status is available for marine scientists via a number of professional bodies. The IMarEST for example offers Chartered Scientist and Chartered Marine Scientist status to suitably qualified, competent and experienced people. The Society of Biology offers Chartered Biologist status.
For information on entry requirements for degree courses, see page 35. Suitable subjects to take at advanced level for entry to biology-related degree courses are biology and chemistry, and either maths, physics or another science.

**Laboratory assistants and technicians**

For those with good GCSEs or equivalent qualifications (including sciences and maths) and even for those with a couple of A levels (including biology) or equivalent qualifications, there are a few openings for laboratory assistants and technicians. However, many employers prefer to appoint people trained to a higher level of specialism in biological sciences. An HNC/D in applied biology or a relevant foundation degree can also lead to technical and research-related posts. For information on entry requirements to higher education courses, see page 35.

**Who employs marine biologists?**

Employers of marine biologists include:

- research and advisory bodies (such as the institutes funded by the UK’s Natural Environment Research Council and the Centre for Environment, Fisheries & Aquaculture Science)
- university research teams
- environmental charities and non-governmental organisations
- commercial fisheries

**Laboratories and Observatories**

There is a rapid expansion in Environmental Work Impact Assessments in UK waters. Much of this needs biologists. The Government has suggested 80,000 jobs—a good proportion will be marine biologists. Job vacancies are often offered for a fixed-term of two to three years to work on a particular project. Many jobs are based overseas...or at sea! It is possible for marine biologists to progress to senior research scientist and management-level positions.

**Where can I find out more?**

- **The Institute of Marine Engineering, Science and Technology (IMarEST)** – tel: +44 (0)20 7382 2600 www.imarest.org
- **The Marine Biological Association** – tel: +44 (0)1752 633207 www.mba.ac.uk

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**CASE STUDY**

**Jo Foden** is a marine ecosystem scientist at the UK government’s marine science agency the Centre for Environment, Fisheries & Aquaculture Science (Cefas).

**How did you become interested in the marine environment?**

I have always had an interest in the environment and I was a high school teacher of geography and environmental science for several years. During that time I learnt to scuba dive and that sparked a keen interest in the marine environment. I was looking for a change of career and thought it would be great to pursue marine environmental science professionally.

**What was your entry route?**

I left teaching and studied for an MSc in Oceanography at the National Oceanography Centre, Southampton. During my MSc studies, Weymouth-based staff at the UK government’s marine science agency the Centre for Environment, Fisheries & Aquaculture Science (Cefas) helped me analyse toxic algae samples for my dissertation studies. This positive experience of Cefas made me eager to work there and in 2003 I successfully applied to a position as a marine ecosystem scientist.

**How has your career progressed so far?**

After several years working as a marine ecosystem scientist at Cefas, and supported by them, I studied for a PhD in Integrated Marine Ecosystem Assessments at the University of East Anglia. On my return to work I started to take a more active role in the application of marine science to policy.

**What are your main responsibilities/tasks?**

My job is very varied. I am actively involved in UK and European projects that seek to share marine monitoring and research efforts and data, through marine observatories. The aim is to improve efficiency and avoid having gaps or overlaps in the way we observe our regional seas. The observatories draw together a broad range of information, for example nutrients, chlorophyll, phytoplankton, marine plants and water-quality data. I then analyse these data to assess the UK’s marine environmental condition, which is then reported for UK policy purposes, for European Directives and international agreements. The next big challenge facing the UK is the EU’s Marine Strategy Framework Directive and I am a delegate on European working groups that are guiding its implementation.

**What are the main qualities and skills you need to do your job?**

Some key skills and attributes are: marine science qualifications to at least MSc level, an understanding of UK and European policies concerned with marine environmental quality, assessment and reporting. An ability to communicate marine science to policy-makers and policy to scientists, Inter-personal skills to collaborate with national and international colleagues, and a willingness to travel.

**Where do you see your career heading?**

I am likely to work increasingly closely with Defra, providing scientific advice and helping to deliver the UK’s commitments to marine policies and EU Directives. I will also be leading a project developing an online system for delivering data and reports that are needed to fulfil these policy commitments.

**What do you enjoy most about your job?**

No two days are the same. Sometimes I have to respond quickly to requests for scientific or policy advice. It’s great working for the public sector in a respected government agency that is recognised across Europe. I enjoy the variety of my work, travelling to European meetings and conferences, collaborating with national and international colleagues and representing the UK in European negotiations.

**Do you have any tips for someone considering a similar career to yours?**

There can be stiff competition to get your first job in marine science because there are a limited number of institutes and organisations. Of course it’s important to have good qualifications to MSc level, but also it can really help to be proactive. Show your initiative by visiting institutes you might be interested in working at and make personal contacts.
Diving – professional divers may work underwater in conditions that are cold, dark and murky - not at all like the sunlit waters that you see in recreational diving magazines, but diving offers an interesting and often very well-paid career with many options for physically fit men and women who don’t want to work at a desk. Some say it’s the closest job to an astronaut’s without going into space.

What opportunities are there?

Commercial divers work offshore, at the coast and in inland waters inspecting and repairing structures such as lock gates, bridge supports, fish farm cages, oil production platforms, wind farms, and the hulls of ships and submarines. They take part in salvage and recovery of sunken ships and aircraft; some work inside sewers or storage tanks. There is great variety. Typical tasks will be inspection, photography, welding, patching, attachment of cables and supervision of other workers. Specialist divers are employed by television and film production companies to obtain high quality images from the underwater environment. Many commercial divers work as contractors for subsea companies; some prefer to be self employed.

Scientific research diving is carried out by a small number of marine biologists, oceanographers and underwater archaeologists. Specialisations include diving under ice in polar regions, working with marine mammals, and cave exploration.

Police and military divers are specialists chosen from personnel already in service, and they undertake a range of military and police duties in an underwater context including tasks such as searching for missing persons and weapons, detection of intruders and underwater demolition.

Recreational or sports diving is a popular hobby and all of these divers need to be trained by professionally qualified divers who are accredited by relevant training agencies. This is one form of diving that may take place in warm sunny waters rather than a freezing lake or harbour.

Divers subject their bodies to conditions rarely experienced in other forms of work, breathing compressed air from cylinders carried on their backs or sides, or through hoses from the surface. There are strict procedures to prevent medical problems or even death as a consequence of attempting to surface too quickly, especially for divers who have spent a long time underwater. For deep water work ‘saturation diving’ is the main technique used, where the diver’s blood is allowed to become saturated with inert gas and they live – even while off duty – in a pressurised chamber, being transported to and from the seabed in a diving bell.

Given the dangers and complexities of sending humans to depth, Remote Operated Vehicles (ROVs) have sometimes replaced divers for deep water work but there are still tasks that only a human can do, particularly where dexterity is required. Some engineering-trained divers work as ROV pilots, driving the machine via a strong tether cable that transmits power and sends back live TV images of the work to the mother ship. The size of vehicles ranges from easily portable “eyeballs” to “work class” ROVs that are larger than a truck and are able to dig trenches and lay pipelines. ROV pilots are often part of the team who service and repair the ROV between dives.

Almost all forms of diving are open to men and women, with some exceptions for military diving and there are additional safety rules for divers who are pregnant. Medical conditions such as asthma and epilepsy would be barriers to employment.

What skills and personal qualities do you need?

A diver needs:
- to be fit, strong and have lots of stamina
- to be extremely safety-conscious – the work can be hazardous
- to be good at multi-tasking
- know their limits
- to be responsible and able to keep calm in a crisis
- to be prepared to work in extreme conditions
- to be a strong swimmer
- to be good at working in a team.
What about entry, training and qualifications?
To be a diver, the level of qualification varies depending upon the work you want to do. For a commercial diver formal academic qualifications may be less important than having competency in welding, cutting and other skills such as those found in the construction and engineering industry. For a scientific diver a relevant degree or post-graduate qualification will be essential.

Before starting a training course to become a commercial diver, you need a certificate of fitness to dive from a medical examiner approved by an appropriate body, such as the Health & Safety Executive (HSE) in the UK; this is renewed annually.

You must gain approved qualifications appropriate for the type of diving you intend to do. The HSE approves qualifications in the UK, and a list of these can be found on their website. Other jurisdictions will have equivalent organisations. It is important to note that recreational diving qualifications such as PADI are not acceptable for commercial diving, but advanced PADI qualifications can be acceptable for working as a recreational instructor or dive leader in some countries.

Many employers require dive-related first-aid certificates. To work offshore, you also need to complete basic offshore safety induction including helicopter ditching procedures, and emergency training courses. Many training schools will teach subsea welding and metal work.

N.B. You will usually need to fund your own diver training, medical examination and first-aid training. To be considered for ROV maintenance work, candidates need to be qualified in mechanical or electrical engineering, hydraulics or electronics. Some independent training companies also offer specialised training.

Who are the typical employers?
Whilst many divers prefer to be self-employed as contractors, employers include:
- International diving contracting companies in the offshore oil and gas sector
- Civil engineering contractors with a diving unit
- Specialist film and media companies
- The Armed Forces of most nations, and Police Diving units of some
- Universities and research organisations – as scientists who also dive
- Diving schools and adventure sports holiday operators.

What about future prospects?
Although it can be expensive to complete the necessary diver training, once qualified, you may be in great demand in certain industries and levels of pay can be high for divers who work in industry (less so for academic/research diving). Although the use of ROVs continues to grow, there will always be a requirement for human divers as well.

Where can I find out more?
The Association of Diving Contractors (ADC) – Website carries details of member organisations that employ divers: www.adc-uk.info
International Association of Diving Contractors www.adc-int.org
Underwater Contractor Magazine www.under-water.co.uk
Health & Safety Executive www.hse.gov.uk/diving
HSE list of approved diving qualifications - www.hse.gov.uk/diving/qualifications/approved-list.pdf
Society for Underwater Technology www.sut.org

Sea Your Future: A Guide to Marine Careers

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How about a Career in Marine Leisure?

‘Marine leisure’ is a broad term covering the thriving global leisure boating/watersports industry. More and more people are spending their leisure time at the coast, or at sea.

Careers range from the engineers and naval architects who design powerboats and yachts to watersports instructors. Just some of the opportunities are described here. For information on careers in boatbuilding and design, naval architecture and marine engineering, see the relevant sections of this guide.

What opportunities are there?

Crewing yachts

There are around 5,000 ‘superyachts’ owned by the very rich, and thousands of smaller ones – both sailing yachts and motoryachts. There are temporary and permanent work opportunities for crew members, including those described below. Jobs are available on private yachts and through yacht chartering businesses.

- **Skippers** (or captains) are responsible for the navigation of the yacht and for everyone’s safety. They need to be familiar with every system. Skippers keep records, set budgets and plan itineraries.

- **Engineers** deal with engine mechanics and maintenance; they also ensure that the plumbing, hydraulics, refrigeration and electrics work properly, troubleshooting when necessary.

- **Deckhands**, or ‘deckies’ perform many tasks and are responsible for maintaining the exterior of the yacht – washing, waxing, polishing, buffing, painting etc.

- **Stewards/stewardesses** are responsible for the interior of the yacht – they clean, do laundry, vacuum and help prepare and serve meals... all in a confined space!

- **Chefs** have to plan extensively to ensure that new and exciting menus are available for, what can be, long periods at sea. They also buy the food and prepare dishes.

Working on a private yacht appeals to those who want to see the world! Jobs can be found through specialist agencies and websites or by simply asking crew at marinas.

Jobs in marinas

There are marinas all over the world – from St Tropez to Florida! They provide facilities for boats and yachts, including berthing and dry storage. Larger marinas may offer fuel, lifting equipment and winter storage, and specialist companies, a chandler’s shop and restaurant may be on site.

There are job opportunities of all kinds, e.g. for marina managers, boat handlers, riggers, crane operators, engineers, boat repairers, as well as for security, administrative, restaurant and retail staff.

Marina managers organise staff, deal with budgets and planning, and with contractual, marine, health and safety and environmental laws and regulations. They may be responsible for the maintenance and dredging of the marina.

Yachting and watersports

There are jobs for suitably qualified instructors all over the world at schools specialising in sailing, diving, surfing and many other watersports. Some people are employed, often on a seasonal basis; others work as volunteers. There may also be opportunities for managers, assistants and crew members.

Watersports may be provided as recreational, educational or self-development activities. As an instructor, you’d need to get on well with people of all ages and backgrounds. In the UK, all commercial providers of hazardous sports to under 18s have to be licensed by the Health & Safety Executive.

Brokerage

Brokers manage the purchase and sale of boats, acting on behalf of the seller and buyer. They negotiate prices, assess value, check on legal ownership and may organise insurance and finance.

What skills and personal qualities do you need?

Apart from competence in your particular area of expertise, you also need:

- to be safety-conscious
- to be responsible, reliable and able to keep calm in an emergency
- excellent teamwork/leadership and communication skills
- organisational skills
- fitness and stamina. Ability in a foreign language is useful.

What about entry, training and qualifications?
Many people work in the marine leisure industry because of an existing interest, such as sailing. There’s no set career pattern – people usually develop their expertise whilst working. To improve your chances of finding work, try to gain as much relevant experience as possible.

There are NVQs for those already working in the industry. Marine Apprenticeships are available for young people. For higher education entry requirements, see page 35.

For some crew jobs, you don’t need any specific qualifications. For others, such as to be a chef or engineer, you usually need training. Yacht engineers may need a commercial engineer licence to work on large vessels. Deckhands often have some experience of carpentry, plumbing or mechanics, for instance. Stewards/stewardesses may have hospitality, catering or cleaning experience.

To skipper a yacht, you need to be an experienced sailor and hold an appropriate qualification. Suitably qualified, experienced and competent yacht engineers can apply for professional registration through the Institute of Marine Engineering, Science and Technology (IMarEST).

Staff with a wide range of skills are needed to work in marinas. Skilled craftspeople can work in companies providing shoreside facilities. Marina managers have to be confident handling all types of boats, qualified in operating VHF radios and need a sound understanding of local weather and tides. Marina managers tend to work their way up and qualifications are available for those already in the role.

To teach yachting or watersports, you need an instructor qualification in your chosen area. To find work, you may need first aid and life-saving qualifications. You may also be subject to criminal record checks.

Various training centres offer courses leading to Royal Yachting Association instructor qualifications (see RYA website below). For details of sea schools and training, see: www.nfss.co.uk

Brokers require a wide knowledge of boats. They also need negotiation and marketing skills. Some have general sales experience or work their way up from junior jobs.

What about future prospects?
There’s expected to be further growth in the marine leisure industry, so prospects for those with the right skills and qualities are good. There’s a shortage of qualified RYA instructors and people to work on boats and yachts. However, competition for some jobs can still be fierce, especially in the more glamorous locations!

There is a shortage of Marine Engineers, therefore, this would be a good career path for people that are interested in it. In most career areas, with experience, and possibly further qualifications, promotion to supervisory or management-level positions may be possible.

Where can I find out more?
British Marine Federation – tel: +44 (0)1784 473377  Careers information can be downloaded from: www.britishmarine.co.uk
British Sub-Aqua Club – tel: +44 (0)151 350 6200.
You can search for schools offering instructor training on: www.bsac.com
Institute for Outdoor Learning – tel: +44 (0)1228 564580
Website provides careers information and a searchable database of activity providers (including watersports) in the UK: www.outdoor-learning.org
The Institute of Marine Engineering, Science and Technology (IMarEST) – tel: +44 (0)207 382 2600 www.imarest.org
Royal Yachting Association – tel: +44 (0)23 8060 4100 www.rya.org.uk/coursestraining
Free guide to careers in Yachting
Superyacht UK – www.superyachts.com  Find further information on a career on superyachts, which training is required, where to do the training and job opportunities.
If you like what you’ve read about the various marine careers featured in this booklet, here’s some more information to help you on your career path. Before you make any decisions, talk to as many people as possible.

**Choices at 14**

Find out what subjects you will need at the level of GCSE, or equivalent, for the career that interests you. For many marine careers, science subjects are important – you may need science and an additional science or at least two separate science subjects. Other subjects, such as design and technology and engineering (if offered at your school), could be helpful.

One or more modern foreign languages may be useful because of the international nature of the marine sector. Don’t forget to work at your maths. English is also important – good communication and teamworking skills are essential for all marine jobs.

In the UK, other qualifications and programmes may be available to you, such as the new Diplomas (see overleaf) and applied science GCSE. You may even be able to take a relevant Apprenticeship. Check whether these programmes and qualifications will allow you to progress to your chosen career or advanced-level course.

**Choices at 16**

When choosing what to do after 16, it’s particularly important to seek specialist advice for the career you are interested in. The following are your three main options:

1. Find an apprenticeship that offers structured training with an employer. In the UK, government-funded Apprenticeships and Advanced Apprenticeships are available in many job areas, including the marine industry. In the UK, government-funded apprenticeships and advanced apprenticeships are available in many job areas, including the marine industry. Apprenticeships lead to nationally recognised qualifications. For more information on Apprenticeships, see: www.apprenticeships.org.uk

2. Look for employment with training. Some employers run their own training programmes which may be available for school-leavers. Once in employment, you could take relevant qualifications. See www.careersatsea.org for details of cadet training opportunities with the UK merchant navy, see www.imca-int.com for opportunities in the offshore oil and gas sector, and see www.royalnavy.mod.uk for opportunities with the UK navy. See the websites mentioned elsewhere in this booklet for a range of other opportunities.

3. Take a full-time further education course. If you take this option, choose a course that will suit you, e.g. consider the assessment methods used (balance between practical work or course work and exams). For entry to certain careers or higher education courses, specific courses or subjects may be specified.

The following are the main advanced-level qualifications you can take (normally on a full-time basis) in the UK:

- **AS and A levels** – including AS/A levels in applied subjects, such as applied science and engineering
- **Scottish Highers and Advanced Highers**
- **BTEC Nationals** – available in various engineering subjects and applied sciences
International Baccalaureate – available in some schools
Diplomas – these are gradually being introduced for those aged 14-19. They’re flexible qualifications combining theoretical and practical learning to equip you with the skills, knowledge and understanding you’ll need for the future. Each Diploma is available at three levels and focuses on a broad area of work, such as engineering.

It’s possible to mix and match, e.g. you could take a BTEC National in applied science and an A level in maths.

Higher education
For some of the marine careers described in this brochure, you need to be a graduate, or educated to degree level. When considering what to study at university and where to go, get as much advice as possible. Think about what kind of university would suit you, the type of course you want to do, the teaching methods used, the way you will be assessed and your future job prospects – what have previous students of the course gone on to do? Look out for university open days and taster courses.

Check whether courses are accredited by the relevant professional institutions.

In the UK, universities stipulate entry requirements in terms of grades to be achieved and/or UCAS Tariff points (see www.ucas.ac.uk for further information). Always check entry requirements carefully with individual universities, as they do vary.

Degrees
Degree courses usually take three or four years full-time. Many can also be studied part-time or by distance learning. Sandwich degree courses include a period or periods of work experience which can be helpful when applying for jobs.

The minimum entry requirements for a degree course in the UK are generally two or three A levels, plus supporting GCSEs, or equivalent qualifications. Universities may accept any of the qualifications listed under ‘Choices at 16’ above, but do check.

N.B. In Scotland, degree courses usually last four years and allow a certain amount of flexibility in the first two years. Entry is possible with Highers and/or Advanced Highers.

Depending on the degree, you may need specific subjects at advanced level. For example, to study marine biology, biology is normally always required and chemistry may be specified or preferred. For marine engineering, maths and often physics are specified. If you take an applied subject at A level, or one of the A level equivalent qualifications listed, you should check their acceptability with individual universities.

If you haven’t studied the right subjects at advanced level, some science and engineering degree courses offer foundation years.

Once you have a degree, you can take a more specialised postgraduate qualification, such as a masters degree.

Higher National Certificates/Diplomas (HNC/Ds)
HNC/Ds are usually vocationally-related qualifications combining theory and practice. HNDs take two years full-time and HNCs are usually taken part-time. With further study, it’s possible to progress from an HNC/D to a degree course. Relevant courses include marine engineering and applied science. Entry requirements are normally one relevant A level, plus supporting GCSEs, or equivalent, such as a suitable NVQ level 3 or BTEC National qualification.

Foundation degrees
These offer a mix of work-related skills and academic study. Relevant courses include marine leisure management, marine science, marine engineering and marine operations. Foundation degrees take two years full-time, and are also available through part-time or distance learning routes – aimed mainly at those in relevant
CHOICES, COURSES, CASH and CONTACTS...

employment. With further study, it’s possible to progress from a foundation degree to a degree course. There are no set entry requirements for foundation degrees – each institution sets its own criteria. You need to show that you have the ability to study at this level.

Accredited higher education courses, sponsorship etc

Lists of IMarEST-accredited marine engineering, science and technology higher education courses in the UK and overseas can be found on: www.imarest.org

Some sponsorships and scholarships are available from professional bodies, employers and higher education institutions. Useful reference publications include:

- *Everything You Wanted to Know about Sponsorship, Placements and Graduate Opportunities* – published by Amoeba Publications
- *University Scholarships, Awards & Bursaries* – published by Trotman & Co Ltd.

Membership of professional bodies

Professional bodies set standards and help their members to develop, to learn and to advance. Many professional bodies have their own exams and qualifications, and individuals can become members.

You’ll notice that a number of the people profiled in this brochure are working towards professional recognition e.g Chartered Status with the IMarEST, for example.

Finding work

The IMarEST website advertises job vacancies in the maritime industries. The IMarEST recruitment partner Matchtech has been supplying engineering jobs for 20 years and covers all levels of position within the marine industry. Jobs may be advertised in the recruitment sections of journals, such as *New Scientist* and *Nature*. Jobs are also advertised in more specialist journals, such as the *Marine Engineers Review, Marine Scientist* and *Offshore Technology*. For more information about finding work visit www.imarest.org

Many of the websites listed at the end of each careers section in this brochure also list job vacancies, and there are many specialist recruitment agencies.

Pay

Pay rates in the maritime industries vary according to the job, employer and country where you work. Here is a rough guide to the kind of salaries (in pounds sterling) that you are likely to command in some of the jobs described in this brochure.

Graduate marine engineers start on about £24–£26,000. This can rise to £50,000+ with seniority and experience. Trainee technicians are paid from around £15–21,000.

Starting pay for new graduates in naval architecture is usually around £24–£26,000, rising with experience to £50,000+ for the very senior jobs.

Graduate starting salaries for hydrographic surveyors are around £18,000 – £25,000, but can rise quickly to £35,000+ or more.

A port operative can earn anything from £12,000 – £25,000 or more, depending on responsibilities, qualifications, shift work etc.

Marine biology technicians are paid around £15,000 – more for senior technicians. Experienced graduate scientists can earn £21,000+; senior scientists and directors of research...
receive up to £50,000 – particularly in commercial concerns. In **oceanography**, scientists in government-funded research establishments earn from around £21-50,000+. Senior scientific officers earn more.

**Divers** are normally paid on a daily basis unless they work for an organisation, such as a defence navy. When they are working, experienced offshore, mixed-gas divers may earn several hundred pounds a day!

**Course and careers publications and websites**

**Course information**
In your school, college or local Connexions/careers service library, consult up-to-date further and higher education:
- prospectuses
- course reference books (some are listed below)
- websites/databases.

For advice on **careers and courses view**
https://nationalcareersservice.direct.gov.uk and for full time **higher education courses** view: www.ucas.com

**CRAC Degree Course Guides: Biological Sciences; Environmental Sciences; Geography & Geological Sciences and Engineering** – all published by Trotman & Co Ltd.


**Progression to Engineering & Mathematics** – published by UCAS.

**The Study Abroad Handbook** – a guide for both undergraduate and postgraduate students from English-speaking countries who want to study overseas – published by Palgrave Macmillan.

Skill, the UK’s National Bureau for Students with Disabilities, has lots of information for people with disabilities about further and higher education. www.skill.org.uk

**Careers information**
Careers information for graduates can be found on:
www.prospects.ac.uk

**Inside Careers Guide to Engineering & Technology** – published annually by Inside Careers. Tel: +44 (0)20 7565 7900 for a copy, or download from: www.insidecareers.co.uk

For information on education and careers in science, engineering and technology, contact IMarEST www.imarest.org
About this publication

This booklet introduces to you some of the exciting careers available in marine science, engineering and technology. In particular it looks at the professional engineers, trained scientists, skilled technicians and support workers who are needed in:

- Marine engineering
- Offshore science and technology
- Offshore renewables
- Shipbuilding and boatbuilding
- Shiprepair and conversion
- Naval architecture
- Hydrographic surveying
- Oceanography and marine meteorology
- Diving and working with underwater vehicles
- Marine biology
- Marine leisure
- Ports
- Marine surveying

For each of these areas, you can find out:

- What opportunities there are and what people do in their different jobs
- The skills and personal qualities you need
- Entry, training and qualifications
- Typical employers
- Prospects for career progression

About the IMarEST

The IMarEST is the international membership organisation for marine engineering, science and technology professionals. The institute supports the learning, development and advancement of its 15,000 members worldwide, and is actively working to ensure that young people, parents, teachers and careers advisors have access to useful information about the exciting, well paid, and rewarding careers that exist in the marine and maritime sectors.

The IMarEST would like to thank Lifetime Publishing for researching and writing the careers information in the first edition of this brochure. Many thanks also to the people profiled in the case studies and all persons who helped to review this brochure for 2013.

The IMarEST would like to extend its gratitude to ABP and Fugro for sponsoring this publication.