A FUTURE IN MARITIME ENGINEERING
From very early in the history of human endeavour, we have travelled the seas and gathered and harvested resources from the oceans. The equipment and technology required for maritime activities in the modern age is created by maritime engineers who face increasingly diverse challenges and demands.

Naval architecture, ocean engineering, and marine and offshore engineering, are the sectors that design, build and maintain marine craft, operational systems, underwater and floating structures and associated machinery. These include ships, pleasure craft, luxury yachts, oil rigs, offshore wind energy platforms, undersea pipelines, ports and harbours, underwater remote operated vehicles and more.

Marine structures, vessels and ocean systems present numerous design and manufacturing challenges because they are very large and complex – yet only a small number of each design is built – and they operate in a marine environment.

The three major domains in marine engineering are:

1. **Naval architecture** – graduates employed by ship building companies, from naval vessel to super yacht yards, working as contractors or supervisors overseeing new builds and maintenance for a range of customers from private to government.

2. **Offshore engineering** – graduates employed by companies designing, installing and maintaining all types of fixed and floating offshore structures. Traditionally based around oil and gas installations, there is a growing demand in renewable energy installations, offshore food productions (aqua farming), and development of techniques and technologies for the exploration and protection of our oceans.

3. **Marine and Offshore Engineers** – graduates employed by marine and offshore industries, working on the design, manufacture, deployment and commissioning of machinery and systems associated with the marine and offshore industries, from engines and propulsion to fresh and grey water, HVAC (heating, ventilation and air conditioning) and electric and electronic systems on board.

However these domains are not fixed and opportunities open up across all three, whatever your maritime qualification.

If you have a head for maths and science, love solving problems, love the ocean and want to travel, a career in maritime engineering could be just the ticket for you.
OUTLOOK AND TRENDS

Maritime engineering is fast growing and dynamic, with employment opportunities that continue to increase as people turn to the oceans for resources such as food, transportation and energy. Government, industry and academia are hungry for experts and researchers to develop new processes and systems to explore and travel the ocean, achieving economic and social goals, while minimising impact on the environment.

Offshore development

Globally there is strong demand for offshore engineering, from traditional oil and gas to offshore renewable energy (fixed and floating offshore wind turbines, tidal and wave energy devices), offshore aquaculture and specialised equipment needed for scientific ocean exploration. However, economic ocean activity also poses a threat to the ecological health of the world’s oceans. This will be one of the biggest challenges for decades to come and ocean engineers will be at the forefront of all technical developments.

Strong demand for offshore aquaculture installations (remote offshore fish farming etc.) is expected during the next decades, along with innovations in localised offshore renewable energy generation. AUT, together with NZ industry partners and the Australian Maritime College, is currently bidding for the ‘Blue Economy Cooperative Research Centre’ which aims to deliver innovation in sustainable seafood and renewable energy for marine nations in the south pacific region. This will ensure NZ industries gets access to first class research and become leaders in seafood technology and aquacultures.

Global shifts

The key areas of growth and activity are shifting. Within the last decade, China has massively invested capability in all areas of maritime engineering. Production lines are delivering large numbers of quality, fast ships. European production is now mostly centred on more specialised ships.

New areas of offshore oil and gas exploration such as Brazil and the Arctic present challenges in the form of ultra-deep water and severe physical conditions.

Ship design and construction

The shipbuilding market is expected to grow with the increase of seaborne trade, economic growth and rising energy consumption. Although New Zealand’s commercial ship construction industry is small compared to other bigger countries, numerous workboats, ferries, patrol type vessels, tugboats, barges and recreational vessels are being built every year.

Shifts in growth

New Zealand’s ship building industry, especially super-yachts, has undergone major changes during the last decade because of increasing competition from the northern hemisphere. However there are signs of new growth in New Zealand with several contracts recently awarded to Kiwi firms/operations. This is due to a shift from new builds to refits and maintenance, and from super-yachts to work boats.

The America’s Cup will also soon bring work for naval architects and boat builders because the support people and Cup tourists who visit will require support, maintenance and refits while being here.

Greener shipping fleets

New regulations require fleets to be ‘green ships’ as demand increases for new, eco-friendly ships and shipping services. This means new ships are built to more rigorous environmental standards and older ships are upgraded. This impacts on ship design and marine and offshore systems.

WORK SETTINGS

Work environments are diverse and widely spread around the world. Some roles may primarily be office-based, computer-facing situations. Many involve travel and spending substantial time onsite, eg in shipyards, factories, oil rigs, ports and on board the ships and structures themselves.

Employers include ship building businesses, shipping and transport companies, energy companies, government agencies, research organisations, universities, the Royal NZ Navy and other navies. Marine consultancy companies also offer employment opportunities with commercial vessel owners to supplement their own operational engineering teams.
SALARY GUIDE

Maritime engineering is a highly globalised industry; overseas salaries may vary considerably from the figures given below.

<table>
<thead>
<tr>
<th>Position</th>
<th>Usual salary (per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine engineers (starting)</td>
<td>$60,000 - $80,000</td>
</tr>
<tr>
<td>Marine engineers (5 years + experience)</td>
<td>$83,000 - $180,000</td>
</tr>
<tr>
<td>Naval architects graduates</td>
<td>$50,000 - $60,000</td>
</tr>
<tr>
<td>Naval architects (3 years + experience)</td>
<td>$60,000 - $150,000</td>
</tr>
<tr>
<td>Boat designers</td>
<td>$35,000 - $70,000</td>
</tr>
</tbody>
</table>

Sources: Able Ships, Careers NZ

Salary range is indicative of the New Zealand job market at the time of publication and should only be used as a guideline.

THE AUT ADVANTAGE

AUT's Bachelor of Engineering (with maritime majors), the first degree of its type available through a New Zealand university, is offered in partnership with the Australian Maritime College (AMC) in Tasmania. The first two years are completed at AUT in Auckland, the final two years at AMC.

FURTHER STUDY OPTIONS

At AUT, further study is available in maritime engineering, at postgraduate level, through a Master of Engineering, Master of Engineering Project Management or Master of Science.

At AMC, postgraduate options include: Master of Applied Science (with maritime specialisations); Master of Engineering (with maritime specialisations); MBA (Maritime and Logistics Management).
“I’m getting to do stuff with ships and boats all day and every
day – it is pretty much perfect because I have had a passion for
ships since I was three years old.
A lot of work I do currently as a graduate naval architect is
stability analysis, which is looking at the stability of different
ships. Set criteria has to be met providing regulation and
guidance for the stability of a ship when subjected to varying
sea conditions. This includes checking loading conditions won’t
make the ship unstable and setting up tools so that crew can
check their ship’s stability themselves.
Sea keeping is another thing we do. That is making calculations
of the motions of ships and how they will/do handle different
seas and wave patterns. I’ve also just completed an investigation
looking at the hydro dynamics of the propellers for a ship.
Typically I’m behind the desk but with most projects I do go on
board to have a look at what we’re working on and talk to ship
crew.
We work with commercial and naval ships. We occasionally
work on new design but most of our work is on existing ships.
This provides invaluable experience because I’m learning all the
fundamentals and getting a solid understanding of what ships
need and the whole life cycle of a ship rather than working on
the design of a ship that gets built and I then don’t interact with
again.
As time goes on, I intend to go for my chartered engineering
status – I need four to five year’s experience to do this.”

KEVIN BONE
Graduate Naval Architect, Marine Industrial Design,
Babcock International
Bachelor of Marine Engineering in Naval Architecture

“Kevin did two naval architecture internships over two summers
and is now here full-time. We look for someone with good
technical grasp of the fundamentals of engineering and naval
architecture who has CAD skills in 2D and 3D and strong report
writing capabilities.
They need to be logical, accurate and factual in their reports.
Kevin slotted in well and has quickly become a key team member.
He has a strong technical understanding and doesn’t need a lot of
supervision. Kevin has the CAD skill level we needed, structural
analysis skills and good report writing – he generates reports we
can issue to clients without lots of re-work.
Although there is plenty of work worldwide, particularly in the
UK, Middle East and Australia, job prospects for naval architects
are tough in New Zealand where most designer businesses
consist of one to three people. There’s a lot of competition for
places.
MID’s team of 10 is the biggest single NZ employer of naval
architects in the commercial sector (the Navy has more). Our
parent company, Babcock, has an engineering team of 70,
consisting mainly of mechanical and electrical designers.”

EMPLOYER COMMENT

JASON SMITH
Principal Naval Architect and
Manager of Marine Industrial Design (MID)
USEFUL WEBSITES

Maritime New Zealand
www.maritimenz.govt.nz

International Maritime Organisation
www.imo.org

Institute of Marine Engineering, Science and Technology
www.imarest.org

RINA (The Royal Institution of Naval Architects) is international but has a NZ branch.
www.rina.org.uk

NIWA (National Institute of Water and Atmospheric Research)
www.niwa.co.nz

Australian Maritime College (AMC) / University of Tasmania
www.amc.edu.au

For the most up-to-date maritime engineering information, visit our website:
www.aut.ac.nz/maritime

To get employability and career support, book an appointment through Employability Lab Online
www.aut.ac.nz/elab

Read other Future Career Sheets at www.aut.ac.nz/careersheets

You can also contact the AUT Student Hub team for help and advice:

0800 AUT UNI (0800 288 864) email: studenthub@aut.ac.nz

CITY CAMPUS
55 Wellesley Street East, Auckland Central