A FUTURE IN
MECHANICAL ENGINEERING
“Scientists dream about doing great things. Engineers do them.” – James A. Michener

Mechanical engineers create, build and maintain the mechanical devices that we use on a daily basis. They apply the fundamentals of science and mathematics to create practical, useful solutions for the increasingly complex problems of the modern world. Their scope can range from research and development to design and manufacture, installation and final commissioning.

You could be involved in activities such as:
- producing equipment to help purify water, utilise solar energy or reduce pollution
- designing innovative medical equipment that reduces pain or saves lives
- developing cars, ships, planes and trains that are stronger and safer and have less impact on the environment
- developing manufacturing processes that use less energy and are more productive

Are you curious about how things work and the world around you? Do you love challenges and solving complex problems? Are you strong at maths, physics and/or chemistry and a creative, innovative, practical person? If so, mechanical engineering could be the career for you.

WHAT IS MECHANICAL ENGINEERING?
OUTLOOK AND TRENDS

The outlook is bright for those entering mechanical engineering careers, both at professional and technologist levels. Although manufacturing activity has fluctuated in New Zealand, the Christchurch rebuild is driving demand for building services engineers and operations engineers are required in growth industries such as dairy processing.

According to the Occupational Outlook 2015 projections, employment for engineering professionals (all fields of engineering) will increase at over 3% through to 2023. Mechanical engineers are in demand, appearing on Immigration New Zealand’s long term skill shortage list; a strong indication of a high need for those skills. However, many employers are looking for experienced professionals, so students must ensure that they gain as much practical experience as possible while completing their studies.

Globally, emerging fields like biotechnology, materials science, nano-technology and sustainable design are expected to create new job opportunities for mechanical engineers. In particular, medical biotechnology is starting to provide opportunities for mechanical engineers who specialise in design mechanics.


WORK SETTINGS

Mechanical engineering is a broad discipline, providing opportunities in a wide range of sectors such as agriculture, manufacturing, power/energy, building and construction, transport, medical, and aviation and boat building. The majority of employers are private companies or consultancies.

Even within one sector or industry, the options are diverse. For example, at Beca, mechanical engineering graduates may work in heavy industrial, food and beverage, water and wastes, or building services.

Specialisations and advancement

Most mechanical engineers develop expertise and skills in specific areas, including:
- Manufacturing
- Energy generation
- Robotics
- Building services: heating, ventilation and air-conditioning, lighting, power supply, lifts and security systems for commercial buildings;
- Acoustic engineers control unwanted noise and design spaces such as concert halls and lecture theatres.

As experience is gained over a number of years, mechanical engineers may move into consultancy, project management or senior/managerial roles.

Work environments range from offices and business premises to factories, workshops and construction sites. Depending on the nature of the work and the type of role, it may be necessary to travel locally or overseas. Hours of work are generally in line with standard business hours, though evening or weekend work may sometimes be required as project deadlines approach.

CAREER ROLE EXAMPLES

**Mechanical Engineer – Building Services**
Works in a collaborative team environment with engineers and architects creating designs for mechanical services and working closely with clients, contractors and suppliers for building projects. The role may include designing HVAC (heating, ventilation and air conditioning) systems and water services systems/hydraulics for building projects.

**Mechanical Design Engineer**
Develops new products or components such as domestic appliances, medical devices or mining equipment. Takes conceptual ideas and develops them into production machines for the marketplace. The work may involve proof of concept testing, improving the design of existing products for performance and manufacturing purposes, and the creation of manufacturing drawings for component parts and assemblies.

**Production Engineer**
Responsible for making sure the machinery in large-scale manufacturing operations runs smoothly. Diagnoses and repairs faults on production machinery. Modifies existing machinery, develops new processes and commissions new machinery. May organise other staff and liaise with tradesmen and suppliers.

Non-technical careers in the engineering sector
A number of the larger employers run graduate schemes in areas such as finance and management. Engineering graduates can also work in areas such as supply chain or technical sales. Some graduates start off in an engineering role, then progress into a more business-focused career at a later stage.

PROFESSIONAL REGISTRATION

Registration with the Institution of Professional Engineers New Zealand (IPENZ) is either required or strongly recommended for people working in the industry. IPENZ operates national registers that recognise engineers in three broad groups – Professional Engineers, Engineering Technologists and Engineering Technicians. www.ipenz.org.nz
SKILLS AND KNOWLEDGE

- Project management, including:
  - Ongoing liaison between project teams and clients
  - Inquiry follow-up and distribution of duties
  - Writing and submission of proposals and project reports
  - Co-ordination of project activities with all project staff
  - Conducting project reviews and providing status updates to management

- Teamwork and leadership strengths

- Excellent communication skills, both written and oral

- High level analytical and problem-solving skills

- Strong planning, organisational and time management capabilities

- Computer skills, including the ability to use computer-aided design (CAD) and mathematical modelling software

Knowledge

- Statics, dynamics and strength of materials

- Mechanical processes and engineering operations

- Properties and behaviour of gases and liquids

- Fluids, thermodynamics and heat transfer

- Safety regulations and quality standards

- Design and management

- Relevant legislation such as the Resource Management Act, the NZ Building Code, local by-laws and town planning regulations

PERSONAL QUALITIES

- Creative, innovative, practical and curious about how things work

- Have the desire to help people and improve the world around you

- Enjoy learning how to make things work more efficiently

- Highly organised, logical thinker with an eye for detail

- Responsible, adaptable, practical, accurate and methodical

- Confident decision-maker who can remain calm in stressful situations and when meeting deadlines.

SALARY GUIDE

### Mechanical engineering technicians

<table>
<thead>
<tr>
<th>Role</th>
<th>Salary (per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate roles</td>
<td>$40,000 - $45,000</td>
</tr>
<tr>
<td>With 4 to 6 years' experience</td>
<td>$60,000 - $80,000</td>
</tr>
<tr>
<td>Senior management roles</td>
<td>$80,000 - $140,000</td>
</tr>
</tbody>
</table>

### Mechanical engineers (professional)

<table>
<thead>
<tr>
<th>Role</th>
<th>Salary (per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduate/starting salary</td>
<td>$45,000 - $65,000</td>
</tr>
<tr>
<td>Experienced</td>
<td>$65,000 - $115,000</td>
</tr>
<tr>
<td>Experienced working in a position of responsibility</td>
<td>$100,000 - $145,000</td>
</tr>
</tbody>
</table>

Sources: Futureintech, IPENZ, 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 graduates enter the employment market with knowledge and skills that have been tested in practical situations and working environments such as industrial projects and the Engineers Without Borders international design challenge (www.ewb.org.nz).

All graduates of the engineering and engineering technology degrees complete a final-year project that provides, in many cases, industry experience in areas such as research, production processes, management techniques and design.

FURTHER STUDY OPTIONS

Further study in mechanical engineering is available at postgraduate level, including the Postgraduate Certificate in Engineering, Postgraduate Diploma in Engineering, Master of Engineering, Master of Construction Management, Master of Engineering Project Management, Master of Philosophy and Doctor of Philosophy. Research areas include electronic modelling, diagnostics and control, materials and manufacturing processes.
“My primary role involves the design and development of new products used in secure transactive applications for Direct Payment Solutions. I design products to suit a customer’s new or existing needs and follow the process right through to post-production, in an effort to continually improve the products we design. I also create testing rigs and jigs that are used in the testing and assembly of products.

It is amazingly rewarding to see a product that you’ve spent many months designing and refining as a physical model being deployed and used by people every day. I also enjoy the day to day variety involved and tasks where I can be away from my desk, like meetings with suppliers or manufacturers, or working on the machinery to produce prototypes.

Design is also one of the most challenging aspects of my job as it requires me to resolve a wide range of considerations. Designing to industry regulations and meeting customer expectations as well as ensuring that the design can be produced viably and sustainably is a fine balance.”

MARK HAWKINS
Mechanical Design Engineer, Direct Payment Solutions
Bachelor of Engineering (Honours) in Mechanical Engineering

“We look for people who have excellent collaboration and communication skills, and strong practical knowledge with the supporting theoretical base to problem solve effectively and viably. Engineers must also be able to work independently on their respective tasks and display focus in prioritised tasks.

Mark began working with us as an intern and is now employed as a Mechanical Engineer. The transition from intern to full time employee was an easy one for Mark as he was able to develop a familiarity with the products quickly. Mark has demonstrated good communication in working with the Hardware Engineers in the designing of the new products as well as an ability to assess designs based on their strengths and viability.

My advice to students is to get involved with as many collaborative projects as you can to build your communication skills whilst still at university. Work with people in different specializations to expose yourself to some of the unique terminology and thought processes.”

Steve Roach
Commercial Manager, Direct Payment Solutions
USEFUL WEBSITES

Engineering New Zealand
www.engineeringnz.org

Maintenance Engineering Society of New Zealand
www.mesonz.org.nz

Beca New Zealand
www.beca.com/join-our-team

Fisher and Paykel Appliances
www.careers.fisherpaykel.com/graduates

Fisher and Paykel Healthcare

FURTHER INFORMATION

For the most up-to-date information on mechanical engineering study, visit our website: https://www.aut.ac.nz/mechanical-eng

FUTURE STUDENTS

Contact the Future Student Advisory team for more information: www.aut.ac.nz/enquire
futurestudents@aut.ac.nz
@AUTFutureStudents

CURRENT AUT STUDENTS

Contact the Student Hub Advisors team for more information: 0800 AUT UNI (0800 288 864)
www.aut.ac.nz/enquire
studenthub@aut.ac.nz
@AUTEmployabilityandCareers

EMPLOYABILITY & CAREERS

For other Future Career Sheets visit: www.aut.ac.nz/careersheets

For employability and career support, AUT students can book an appointment through https://elab.aut.ac.nz/

CITY CAMPUS
55 Wellesley Street East, Auckland Central

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The information contained in this career sheet is correct at time of printing, August 2019.