

ENGINEERING

What's it all about?

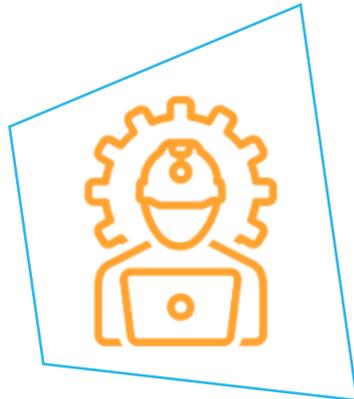
Workshop Rundown

**Define
Engineering**



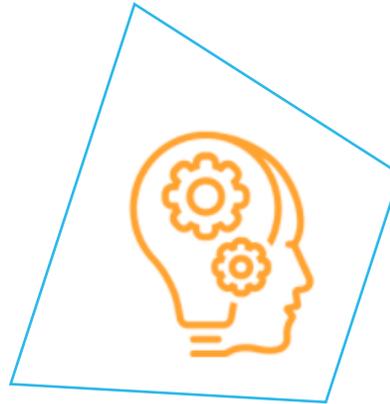
Define what engineering entails.

**The roles of
Engineers**



Explore what engineers do within their work.

**Types of
Engineering**



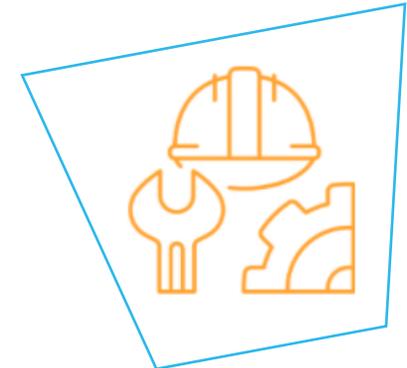
Identify the various types of work that encompass engineering.

**Myth busting
about engineering**



Distinguish between myths and facts about engineering.

**Meet some
Engineers**



Explore the different people who are now engineers.

Define
Engineering



ENGINEERING

What is it?



If you're envisioning hard hats and wrecking balls, stop right there. It's time to clear out any preconceived ideas about engineering and learn about the 21st century definition of engineering.

Engineering is defined as:



"The branch of science and technology concerned with the design, building, and use of engines, machines, and structures."

"A field of study or activity concerned with modification or development in a particular area, e.g. software engineering."



"The action of working artfully to bring something about."

Define
Engineering



ENGINEERING

What is it?

The term 'engineering' covers many fields and, therefore, many skills.

Engineering disciplines cover:



Mechanics and the construction of tools and machines of all sizes, from the nano scale to entire manufacturing facilities.



The design and production of chemical compounds.



Entertainment, industry, construction, transport, healthcare, defence and more!



The creation of cars, trains, ships, boats, aircraft and all other vehicles.



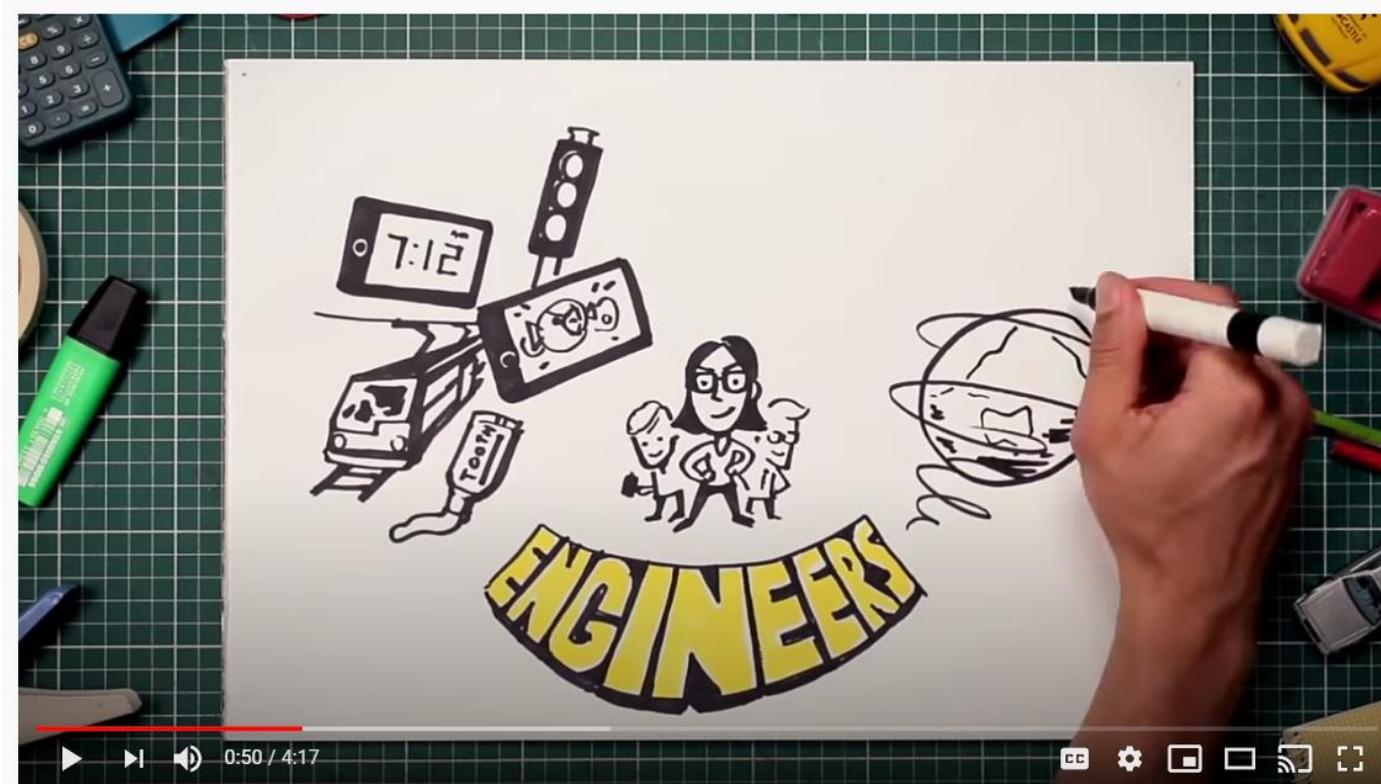
Operations of businesses and cities.

Define
Engineering



BE MAKERS

'Engineers are our future'



https://www.youtube.com/watch?time_continue=29&v=bipTWWHya8A&feature=emb_logo

Define
Engineering



ENGINEERING

Key Skills

There's no one singular career that defines everything that engineering encompasses. However, there are a few key skills that are central to all engineering careers.



Problem Solving



Technical Skills



Design Thinking



Innovation



Creativity



Mathematics and Science

Define
Engineering



ENGINEERING

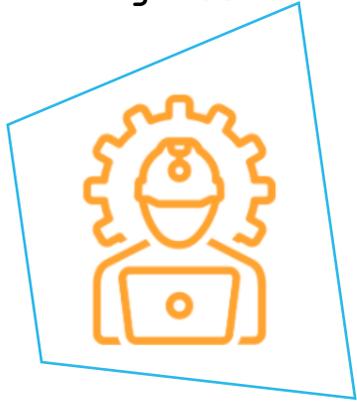
A part of Human Civilisation

The history of engineering is part and parcel of the history of human civilisation.



The Pyramids of Giza, Stonehenge, the Parthenon and the Eiffel Tower stand today as monuments to our heritage of engineering.

Today's engineers not only build huge structures, such as the International Space Station, but they are also building maps to the human genome and better, smaller computer chips.



ENGINEERS

What do they do?

Engineers design, evaluate,  develop, test, modify, install,  inspect and maintain a wide variety of products and systems.



They also recommend and specify materials and processes, supervise manufacturing and construction, conduct failure analysis, provide consulting services and teach engineering courses in colleges and universities.



TYPES OF ENGINEERING

Four broad disciplines

Historically, mainstream engineering was divided into the four broad disciplines with several branches within each discipline covering an enormous range of fields.

1

Chemical Engineering

2

Civil Engineering

3

Electrical Engineering

4

Mechanical Engineering



ENGINEERING SECTORS

So many possibilities

Engineering encompasses so many different sectors and specialties.
These sectors can overlap and work together.
Here are just some of these sectors:



Aerospace Engineering



Agricultural Engineering



Biomedical Engineering



Chemical Engineering



Civil Engineering



Structural Engineering



Transport Engineering



ENGINEERING SECTORS

So many possibilities

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Here are just some of these sectors:



Coastal and Ocean Engineering



Environmental Engineering



Electrical Engineering

Marine Engineering

Electronics & Telecommunications Engineering



Mechanical and Manufacturing Engineering

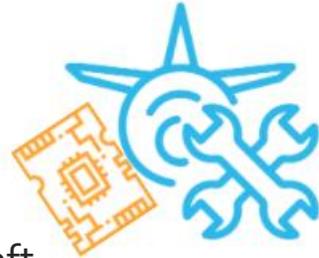


ENGINEERING SECTORS

A closer look at some...

Here is a description of some of the sectors within Engineering:

Aerospace Engineering



Aerospace Engineers design, construct and operate aircraft, aerospace vehicles and propulsion systems. This includes planes, jets, helicopters, gliders, missiles and spacecraft.

They are involved in researching, developing and testing new materials, engines, body shapes and structures that may increase the speed and strength of aircraft.

There are three main areas of work in the aerospace industry; design and manufacture, research and development and airworthiness operations.

A new graduate engineer may be involved with one aspect of a project such as calculating the type and weight of material to go into a component.



ENGINEERING SECTORS

A closer look at some...

Agricultural Engineering



Agricultural engineers are involved with conserving and developing the world's natural resources including soil, water, land, rivers and forests. They research and develop solutions to combat problems such as soil erosion and salinity. They are responsible for designing better methods of farming and forestry, improved farming machinery and buildings and also in lessening the impact of humans on the environment.

Many Agricultural Engineers are employed by government departments in such areas as water supply, agriculture, forestry, soil conservation and in environment protection agencies.

Private employers may include consulting firms, manufacturers and distributors of agricultural and irrigation equipment, corporate farms, intensive animal industries and food processing plants. Work may also be available on overseas agricultural aid programs.



ENGINEERING SECTORS

A closer look at some...

Biomedical Engineering



Biomedical Engineers work with doctors and medical scientists, researching and designing ways to improve health care and medical services.

Biomedical Engineers use microcomputers, lasers, and other materials to develop and improve medical research equipment that is used to diagnose health problems. They may be involved in the development of medical products and different types of equipment used to monitor and treat patients and in designing and improving equipment for disabled people.

A Biomedical Engineer working in a hospital, for example, may be responsible for the safe and effective operation of equipment such as monitoring, diagnostic, and therapeutic medical equipment ranging from catheters, CAT scanners, pacemakers and kidney machines.

Biomedical Engineers may be involved in designing artificial joints and limbs and assisting the surgical team in fitting these to the patient. They design and deliver technology to improve the quality of life of people with disabilities.



ENGINEERING SECTORS

A closer look at some...

Civil Engineering



Much of the physical infrastructure of our modern society is provided by civil engineers. Civil Engineers are concerned with all types of structures including dams, bridges, pipelines, roads, towers and buildings.

Civil Engineers are responsible for the design and construction of all our transport systems, the design and management of our gas and water supply, sewerage systems, harbours, airports and railways. They plan, design and test the structures of private and public buildings and facilities.

Civil Engineers are also involved in many environmental areas such as the assessment of the impact large scale projects have on the environment and the collection and treatment of sewage and industrial wastes, pollution control, environmental control and resource protection and management.



ENGINEERING SECTORS

A closer look at some...

Electrical Engineering



Electrical Engineering encompasses electronic, computer systems, telecommunications, control and electrical power engineering.

It is concerned with the way electrical energy is produced and used in homes, the community and industry.

Electrical Engineers design and build the systems and machines that generate, transmit, measure, control and use electrical energy essential to modern life.

Electronics & Telecommunications Engineering

Electronics Engineering deals with devices and systems that use small amounts of electrical energy to analyse, transmit and store information.

Transmission of these electronic signals forms the basis of communications and the information technology industry, and includes the field of microelectronics and the use of silicon chip technology.



ENGINEERING SECTORS

A closer look at some...

Environmental Engineering

Environmental Engineers are concerned with protecting the environment by assessing the impact a project has on the air, water, soil and noise levels in its vicinity. This is done by studying the project's design, construction and operation and minimising any adverse effects that it may have on the environment.

Environmental Engineers are also involved in removing problems caused by past activity. Environmental Engineers predict what problems may be caused by accidents, such as oil spills, and assess what may cause problems for the environment in the long term.



Marine Engineering

Marine Engineers are involved in designing, testing, and improving machinery and equipment used at sea. This machinery may include propulsion machinery, electrical, refrigeration, air conditioning, cargo handling and domestic services equipment.

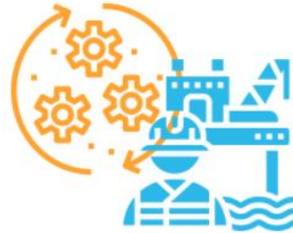
It is their responsibility to check that it is all functioning effectively and being properly maintained. A marine Engineer needs to have a good understanding of the way in which all these systems operate.



ENGINEERING SECTORS

A closer look at some...

Mechanical and Manufacturing Engineering



Mechanical and Manufacturing Engineering turns energy into power and motion. Mechanical Engineers design, create and improve systems and machinery that is used for domestic, public and industrial purposes.

This area covers the design and manufacture of a great variety of products such as domestic appliances, industrial machinery, ships, aircraft, engines, pumps, compressors and turbines or complex systems such as the air-conditioning and ventilation systems of buildings.

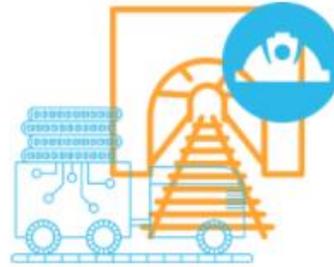
The mechanical area interlinks closely with other areas of engineering and applies knowledge of materials, energy and structures.



ENGINEERING SECTORS

A closer look at some...

Mining Engineering



Mining Engineers work together with geologists to investigate and carry out the extraction of ore bodies and mineral deposits, as well as the extraction of non-metallic ores and fuels such as coal and uranium.

They are responsible for planning the safest and most cost effective way of removing minerals from the ground, rivers or the sea bed. They may be involved with designing, installing and supervising the use of mining machinery and equipment and for inspecting the progress of mining operations.

Mining Engineers work on mining sites and in head offices of mining companies. Many mines are located in remote areas and young graduates should be prepared to travel and live in non-urban areas.

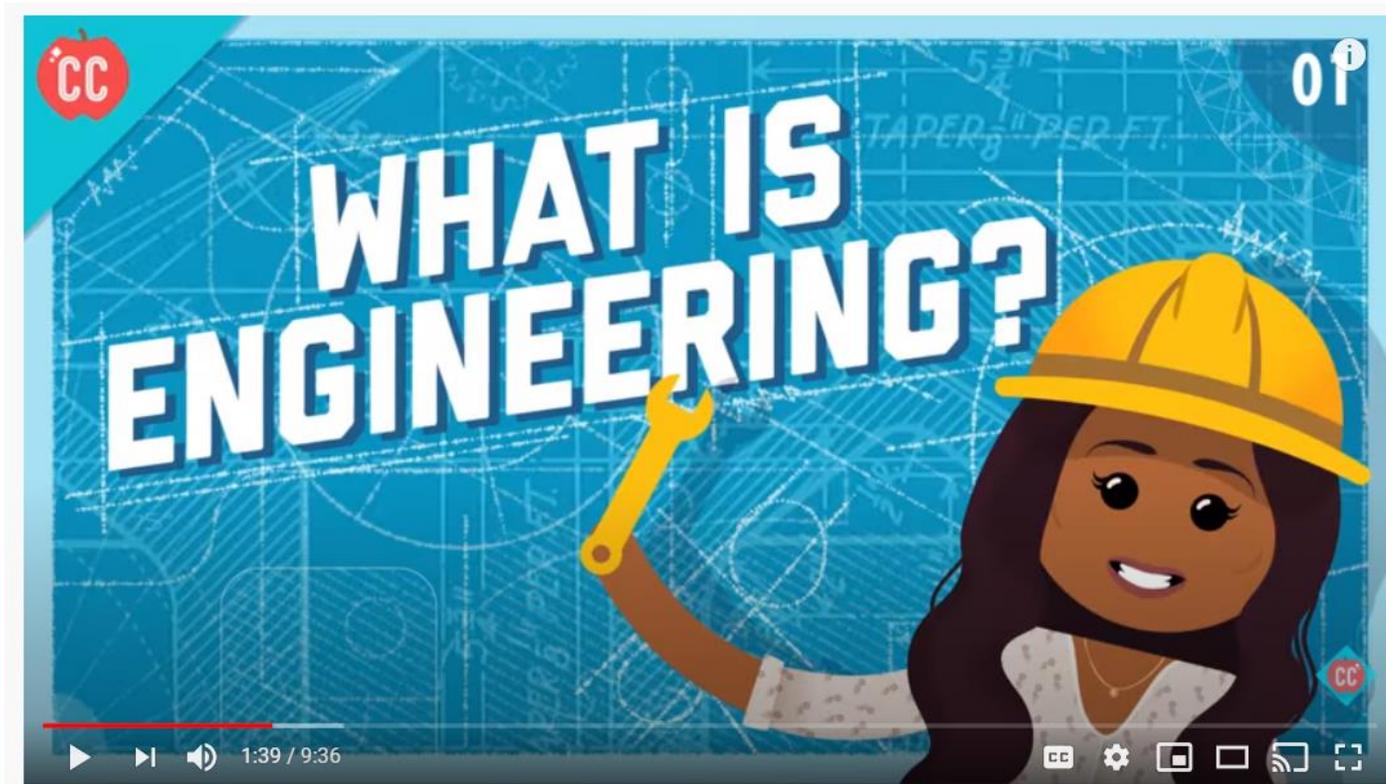
Computerised techniques are often used in the development and operation of mines. Mining Engineers are responsible for protecting conditions for both people and the environment in the vicinity of mines.

Define
Engineering



PROBLEM SOLVERS

'Engineering is everywhere'



<https://www.youtube.com/watch?v=btGYcizV0iI>



MYTH OR FACT ABOUT ENGINEERING

Did you know...?

MYTH

Engineers all work on-site, on big infrastructure projects

DID
YOU
KNOW?

FACT: Engineers work on all sorts of projects, in all sorts of places!

Engineers work on a huge diverse range of projects. Any piece of technology, device, machine or man-made material has had input from engineers, who can work on any aspect of design, construction, testing, operation and maintenance.



MYTH OR FACT ABOUT ENGINEERING

Did you know...?

MYTH

Specific types of engineers all work on one thing

DID
YOU
KNOW?

FACT: The digital revolution saw the definition of engineering evolve and branch out

Civil engineering = bridges, mechanical engineering = engines & gearboxes, electrical engineering = poles & wires... right?

Wrong! These misconceptions are seriously outdated!

There are more engineering specialisations now than ever before.

The digital revolution saw the definition of engineering seriously branching out, with contemporary infrastructure (think software, hardware, data and business processes) often managed by engineers.



MYTH OR FACT ABOUT ENGINEERING

Did you know...?

MYTH

Engineering doesn't require creativity

DID
YOU
KNOW?

FACT: Creativity is crucial for problem solving which is what engineers do!

Creativity is a quality that often gets overlooked in engineers, but you can't address an engineering challenge without creativity.

You need creativity to solve problems.



MYTH OR FACT ABOUT ENGINEERING

Did you know...?

MYTH

Engineers need to be maths wizards

DID
YOU
KNOW?

FACT: The level of maths involved varies between careers

It is true - the first year of engineering courses is pretty maths-heavy. But don't let that deter you! But when you get out into the workforce, it's more about applying those skills, rather than performing complicated calculus wizardry. Most engineers use physics/chemistry, geometry, trigonometry and algebra, with more complicated maths performed computationally.

Some engineering roles are more technical, while others are more project-managed based, so the level of maths involved varies.



MYTH OR FACT ABOUT ENGINEERING

Did you know...?

MYTH



Engineers are all employed as... well... engineers

DID
YOU
KNOW?

FACT: Engineering skills are highly transferable

It's a fair assumption, but a 2017 report by Engineers Australia revealed that only 60% of Australians with engineering qualifications work in jobs that are primarily related to the industry.

Instead, many apply their in-demand problem solving and lateral-thinking skills to roles in scientific research, policy development, business management, financial services, communications and sales...the list goes on! More often than not, there's at least one engineer at the forefront of every tech startup, too.



MYTH OR FACT ABOUT ENGINEERING

Did you know...?

MYTH

Engineers are all about science and not interpersonal skills

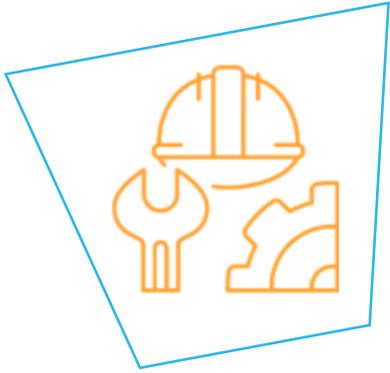
DID
YOU
KNOW?

FACT: Interpersonal skills, especially communication is vital in engineering

People skills are seriously valuable for any career as an engineer.

Engineering is very much about communication.

Studies and reports are finding that two-thirds of all jobs will be
'soft-skill intensive' by 2030.



YOUNG ENGINEERS OF THE FUTURE

Catherine Isaac
Mechanical Engineer



“The potential to improve the hearing of hundreds of thousands of people worldwide, enabling them to hear the voices of their loved ones and hear music again motivates me to do my best everyday.”

Adrian Arumugam
Google Site
Reliability Engineer

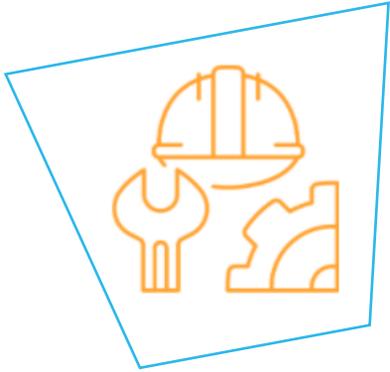


“Every day, when I see the sheer scale of Google’s massive networks and systems... it’s mind-boggling! I just can’t help take a step back and admire what we do.”

Luca Stamatescu
Telstra Graduate
Engineer



“My job involves a lot of rapid prototyping and developing proof-of-concept technologies in artificial intelligence (AI), machine learning and humanoid robotics.”



YOUNG ENGINEERS OF THE FUTURE

Elliot Thomas
Medical Engineering
Student



“My big picture goal is to help as many people as I can. I’d love to work with prosthetics or artificial organs.”

Beth Jens
NASA Propulsion
Engineer



During her PhD on hybrid rocket combustion and its application to space exploration missions, Beth spent time at NASA’s Jet Propulsion Laboratory working on her research. Now she’s a propulsion engineer at NASA.

Carina Pirozzi
Chemical Engineer



Chemical engineering is Carina’s passion because she loves solving problems. “It’s a mixture of logic and science, with a creative twist.”

Meet some
Engineers



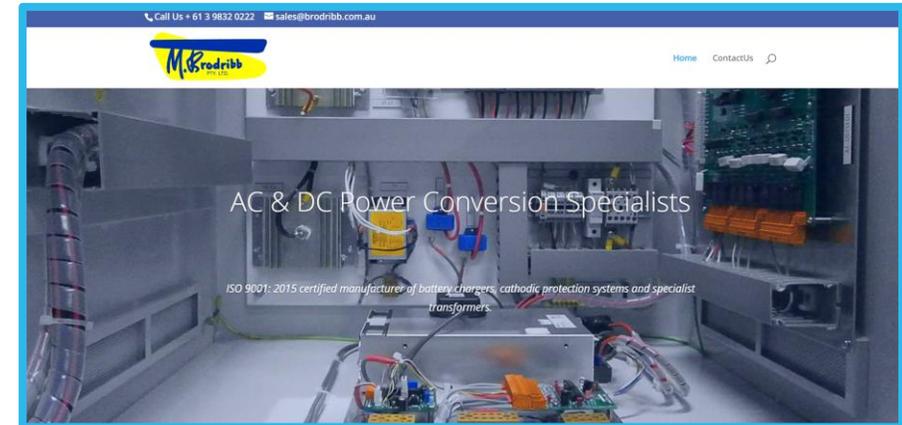
MEET SOME ENGINEERS

Local engineers making a
difference in our community

M. BRODRIBB

Founded in 1946, M. Brodribb Pty Ltd employs highly qualified electrical and electronics engineers to design, supervise manufacture, test and install sophisticated power conversion equipment for:

- Power Commissions
- Major Electrical Contractors
- Local, State and National Government Authorities
- Defence Departments
- Railways
- OEM's - and major projects in the Mining
- Primary and Extractive Industries.



M. Brodribb Pty Ltd have extensive design facilities, including custom written software programs and CAD. M. Brodribb Pty Ltd comprises two divisions: Transformers and Electronics. The Transformer division also produces in-house all transformers, chokes and coils required by the Electronics division.

Finding out more
about engineering

BECOMING AN ENGINEER



You may love designing
and building...

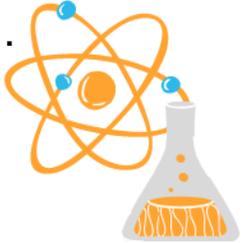


Or have ideas that
will make the world a
better place...



You might even be driven to engineering by a
cause you believe in, such as feeding the hungry
or cleaning the world's oceans...

Perhaps your interest and
aptitude in science and
maths has guided you to
engineering...



"No matter how you arrived at engineering, know this: as an engineer you will face rewarding challenges, work with brilliant minds, put your skills and talents to great use and shape a future where our tools, vehicles, structures and cities are more functional, efficient and accessible."

Engineers Australia has partnered with Australia's Chief Scientist to develop the [STARportal.edu.au](https://www.starportal.edu.au), Australia's first centralised national portal for exciting and engaging STEM activities from around the country.

<https://www.engineersaustralia.org.au/For-Students-And-Educators/For-Secondary-Students>



Finding out more
about engineering

BECOMING AN ENGINEER

TRANSFERRABLE SKILLS



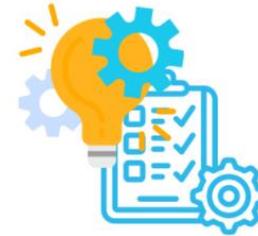
Problem Solving



Communication



Critical Thinking



Project Management



Teamwork



Organisation

RESOURCES

Engineers Australia

<https://www.engineersaustralia.org.au/For-Students-And-Educators/Engineering-Careers/What-Is-Engineering>

Engineer Career List

<https://educatingengineers.com/career-specialties>

Who Wants to be an Engineer? Engineering Quiz

https://trueengineer.rmit.edu.au/?&s_kwcid=AL!10529!3!384494212255!e!!g!!engineer%2otypes&gclid=CjwKCAjw4_H6BRALEiwAvgfzq5RlkljH8AxJUT9U46p7hATQJJTHVFTmROB2ZeyrTg4KIUoops9TnhoCibcQAvD_BwE&gclsrc=aw.ds

Report on Skills

<https://www2.deloitte.com/au/en/pages/economics/articles/soft-skills-business-success.html>

Meet some engineers

<https://careerswithstem.com.au/what-is-engineering/>

Finding out more
about engineering

