Mechanical and Product Design Engineering

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Outlines

- What is Mechanical Engineering?
- What is Product Design Engineering?
- Study Options
- Career opportunities
- Why study at Swinburne?
- Mechanical and Product Design at Swinburne

What is Mechanical Engineering?

Design, analyse, manufacture and maintain engineering systems involving ***motion***

- combines engineering physics and mathematics principles
- one of the oldest and broadest of the engineering branches
- core subjects: material sciences, manufacturing, Newtonian mechanics, heat and fluid flow, energy, etc.

Studying Mechanical Engineering – early years

- **Structures** – are designs strong enough?
- **Dynamics** – how will solid objects move in our designs?
- **Thermodynamics** – how will we manage the flow of heat energy and use it efficiently?
- **Fluid mechanics** – how will fluids move around vehicles, through piping and how can we harness energy in wind and waves?
- **Control theory** – how do we make machines respond automatically?

Design and build objects to apply learning:

- Acrylic gearbox (Machine Design)

- Solar boat (Mechanical Systems Design)

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Mechanical Engineering – final year

Students bring all their knowledge together to work on their final year projects.

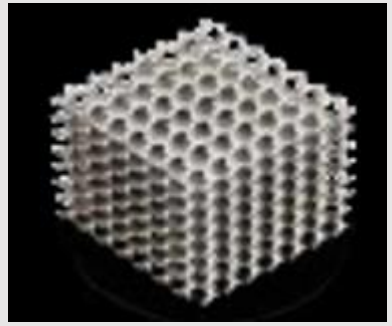
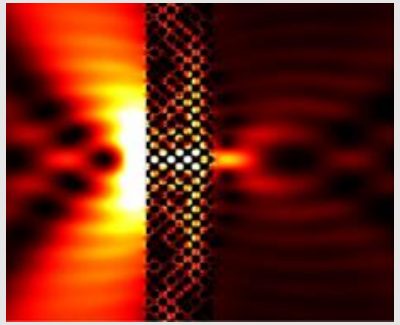
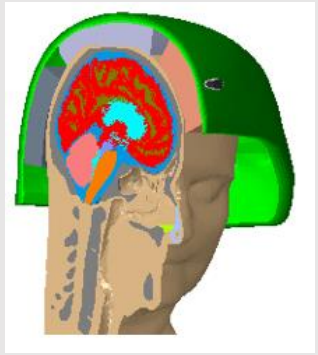
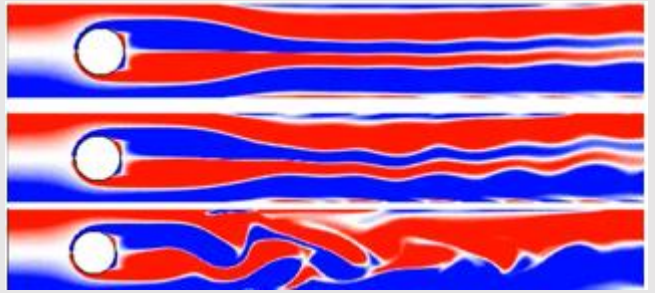
Formula SAE Car

- Students design, build and test their own vehicle
- Swinburne SAE team performed well in FS-Sydney competition in early 2020
  - the Best Presented Team of the Competition
  - 2nd place in EV acceleration
  - 3rd for the Best Overall Electric Vehicle

Mechanical Engineering

Other example projects

- 3D printing and optimization
- Advanced nanomaterials
- Characterization of materials under dynamic loading
- High-temperature materials research
- Medical heart-ventricular assist device
- Power from ocean waves
- Simulation of helmet
- Surface coating techniques
- Surgical robots and Industry 4.0
- Respiratory flows and assisted ventilation

Mechanical Engineering

Mind-controlled wheelchair for people with quadriplegia

A project carried out by Master of Engineering Science Students as apart of their final semester Master Thesis unit in 2019.

It has 2 main parts:

- the 1st is a headset which has built-in Bluetooth
- the 2nd is an ardunio which controls the movement.

Once integrated with the arduino, the headset sends the signals via Bluetooth to the arduino.

https://www.instagram.com/p/B8PjQXBnl1M/

What is Product Design Engineering?

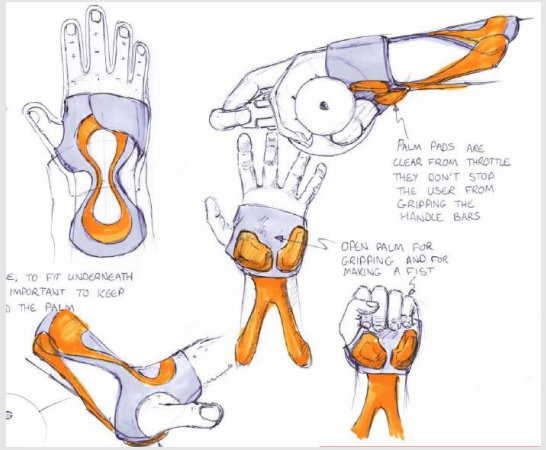
- Mechanical engineering plus **human-centred** design
- design of products that are *operable* and *stimulating* to users
- suitable for students who like both creative, innovative work and science
- unique in Australia – uniqueness is in demand!

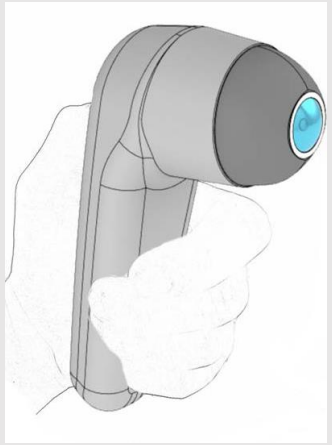
Product Design Engineering – early years

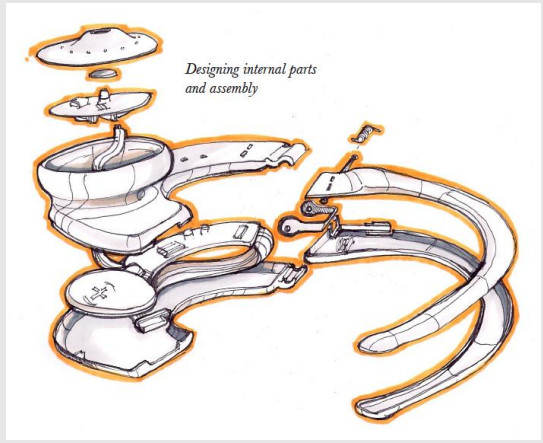
Design studio work

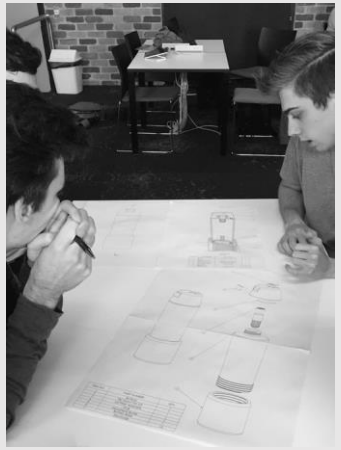
- project-based classes
- computer design
- workshop practice
- model making
- design theory lectures

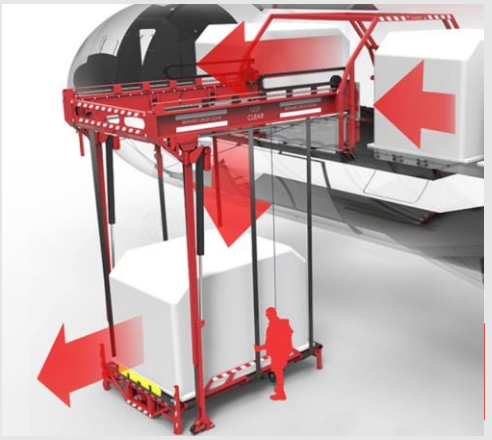
Design (50%) + **Engineering (50%)**









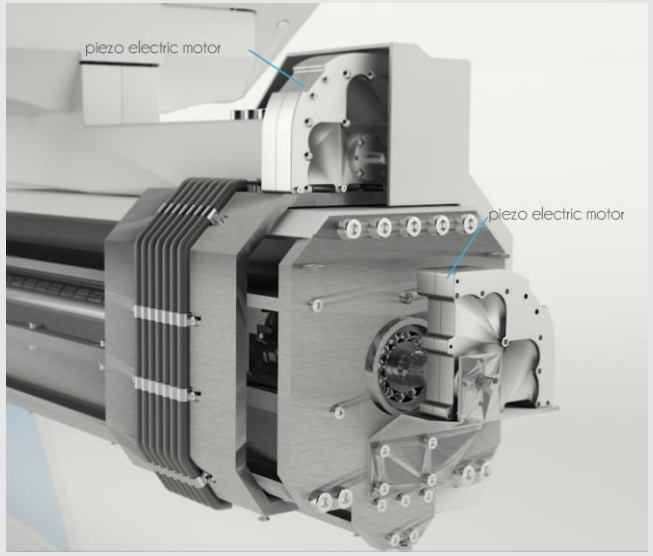


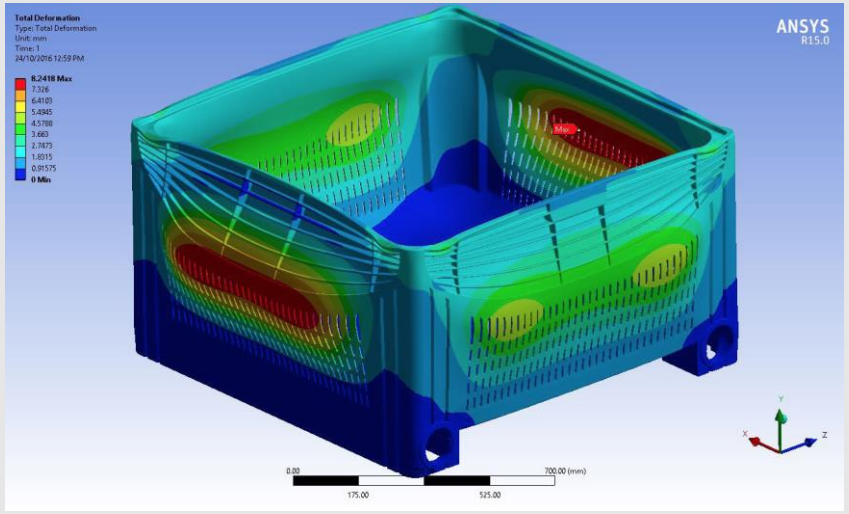
Product Design Engineering – early years

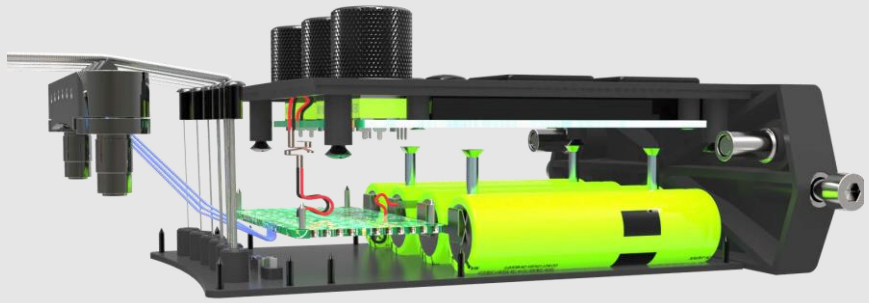
Engineering studies

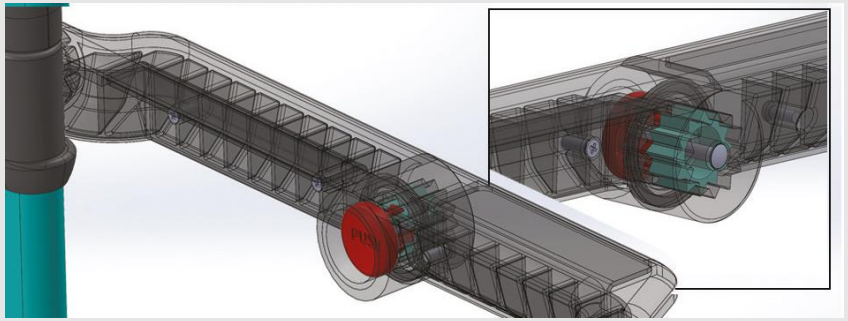
- engineering theory
- computer design
- laboratory work

Design (50%) + Engineering (50%)









Product Design Engineering – final year

Work with an industry client on real-life design problems

Deliver work from creative ideas down to the details, ready for manufacture

Students can find industry partners they prefer– set up their future careers

Sky Master Pro Electric aerial vehicle
by Clint Waters

Surf Life Saving Safety Helmet
by Tim Garrow

Shopping Cart
by En Zhao

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Product Design Engineering

Study Options: Pathways

- **Associate Degree of Engineering (2 years)**
  Graduate as an Engineering Associate or
  pathway into the Bachelor of Engineering (Honours)

- **Advanced Diploma of Engineering Technology, specialising in Mechanical (2 years)**
  Graduate as an Engineering Paraprofessional or
  pathway into the Bachelor of Engineering (Honours)

- **Diploma of Engineering (UniLink) (1 year)**
  Pathway only into the Bachelor of Engineering (Honours) only

Study Options: Undergraduate Degrees

Single Degrees

- Bachelor of Engineering (Honours) (Professional)
  With a major in Mechanical or Product Design Engineering – includes a 12-month paid professional placement (5 years and 475 cps)
- Bachelor of Engineering (Honours)
  With a major in Mechanical or Product Design Engineering (4 years and 400 cps)

Double Degrees

- Bachelor of Engineering (Honours)/Bachelor of Business
- Bachelor of Engineering (Honours)/Bachelor of Computer Science
- Bachelor of Engineering (Honours)/Bachelor of Innovation and Design
- Bachelor of Engineering (Honours)/Bachelor of Science
- Bachelor of Laws /Bachelor of Engineering (Honours)

Select minors from other disciplines.

Progress to postgraduate study with credit. Complete a related master qualification in just one year.

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Study Options: Postgraduate Degrees

Master by Course

- Master of Engineering (Advanced Manufacturing) (1.5 years, 150 cps)
- Master of Engineering (Mechanical) (1.5 years, 150 cps)
- Master of Engineering Science (Advanced Manufacturing) (2 years, 200 cps)
- Master of Engineering Science (Mechanical) (2 year, 200 cps)
- Master of Professional Engineering (2 year, 200 cps)

Higher Degree Research

- Master of Engineering (Research) (2 years)
- Doctor of Philosophy (3-4 years)

Where you'll work – Mechanical Engineering

An engineering degree can take you many places

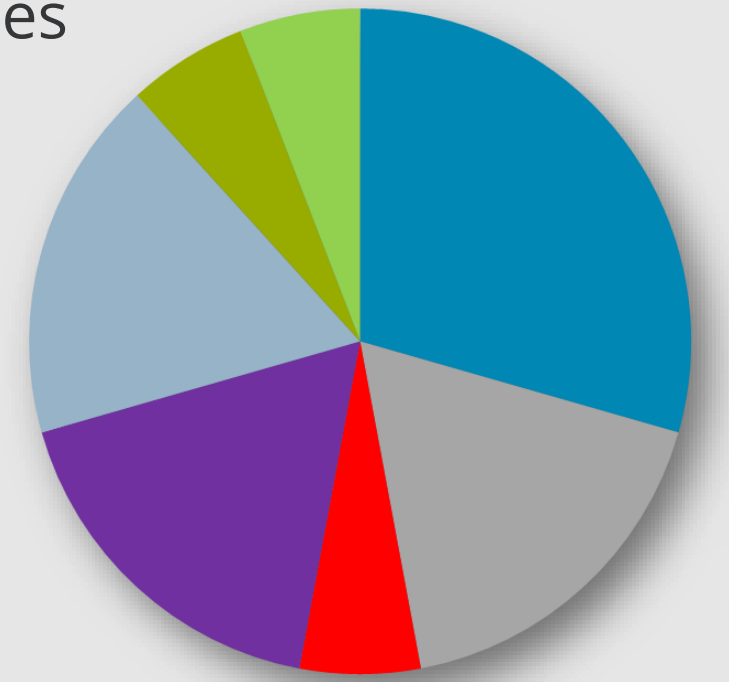
Many industries employ mechanical engineers

Jobs directly related to Mech. Eng. degree include:

- Aerospace engineer
- Automotive engineer
- Contracting engineer
- Control and instrumentation engineer
- Maintenance engineer
- Mining engineer
- Nuclear engineer

Other options:

- Consultants
- Patent attorney
- Insurance firms – evaluate engineering failure
- Finance – for the mathematical ability
- Senior management after promotion
- Intellectual property law
- Graduate programs
- Technical sales engineer



LIBERTY

umicore

BHP

FURNACE

TESLA

Downer
Relationships creating success

Peters

THALES

Henkel
A Brand like a friend

Where you'll work – Product Design Engineering

Unique skills are in demand!

An engineering & design degree can take you many places

- Cross-disciplinary engineering jobs
- Senior management
- Innovation & product management
- Own business
- Intellectual property law
- Graduate programs

WINPLUS
A PRODUCT DEVELOPMENT COMPANY

dyson

Bayly

Australian Government
Department of Defence

Invetech
For your most important projects

DAVEY

innovations

Mondelēz International

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Opportunities in the Post COVID19 World

The spread of COVID-19 affected all nations, all industries and all professions, bringing many challenges, but also opportunities.

- More collaboration
- More efficient approaches
- New focus for governments to take steps to prevent similar outbreaks
  - There will be increased demand for engineering that fights, prevents and treats diseases
  - Some companies might make a permanent shift towards technology that helps save lives

https://www.imeche.org/news/news-article/4-ways-engineering-could-change-after-the-covid-19-pandemic

Why study at Swinburne?

Ranking:

- **Top 50 Universities under 50 years old** (QS ranking)
  https://www.topuniversities.com/university-rankings-articles/top-50-under-50-next-50-under-50/qs-top-50-under-50-2021

- Good Universities Guide 2020 gives Swinburne five stars for the **second consecutive year**
  https://www.miragenews.com/good-universities-guide-2020-gives-swinburne-five-stars/

- The 5-Star rating places Swinburne in the **top 20%** of universities in Australia.

Excellent education experience at Swinburne

- **81.6%** of Swinburne students reported satisfaction with the quality of the teaching they experienced.

- **80.7%** of Swinburne students surveyed reported they were satisfied with the overall quality of their educational experience at Swinburne.

Scholarships

Vice-Chancellor's Excellence Scholarships

- The Scholarship awards students $5,000 per annum
- A one-off payment of $2,000 towards an international study experience
- Achieve an ATAR of 95 or higher; International students are eligible for consideration.

George Swinburne STEM Postgraduate Scholarship

Swinburne International Excellence Pathway Scholarship

Swinburne International Excellence Undergraduate Scholarship

- 10% - 75% off your course fees every year for a maximum of 4 years.

Swinburne International Excellence Postgraduate Scholarship

- 10% - 75% off your course fees every year for a maximum of 2 years.

To find out more visit
https://www.swinburne.edu.au/study/international/scholarships/

Support for Students

MASH

Maths and Statistics Help Centre (Available 9 to 4, 5 days a week)

Mentors

First year students paired with a third or final year student

Rovers

Peer to peer academic support

Connect Study Groups

First-year study groups help with the transition to University

Social events

International Student Welcome, Burn Out Event

Engineering Student Groups

- Women in Engineering
- Engineers without Borders
- Engineers Australia – Swinburne chapter
- Swinburne Tinkerer's Guild
- Team Swinburne Formula SAE
- Young Engineers Social Club
- Swinburne 3D Printing Club
- Engineering Technical Society
- TCP/IP (Telecommunications Club)

International Study Opportunities

International exchange

- more than 100 international partner institutions
- over 20 countries to choose from
- spend one or two semesters overseas

Swinburne Sarawak campus

- study at Swinburne's campus in Malaysia
- Winter Term study tour
- exchange for one or two semesters

Study tours

- between two and six weeks in duration
- learn skills for your career
- unique cultural experiences

Undergraduate Employment and Salary

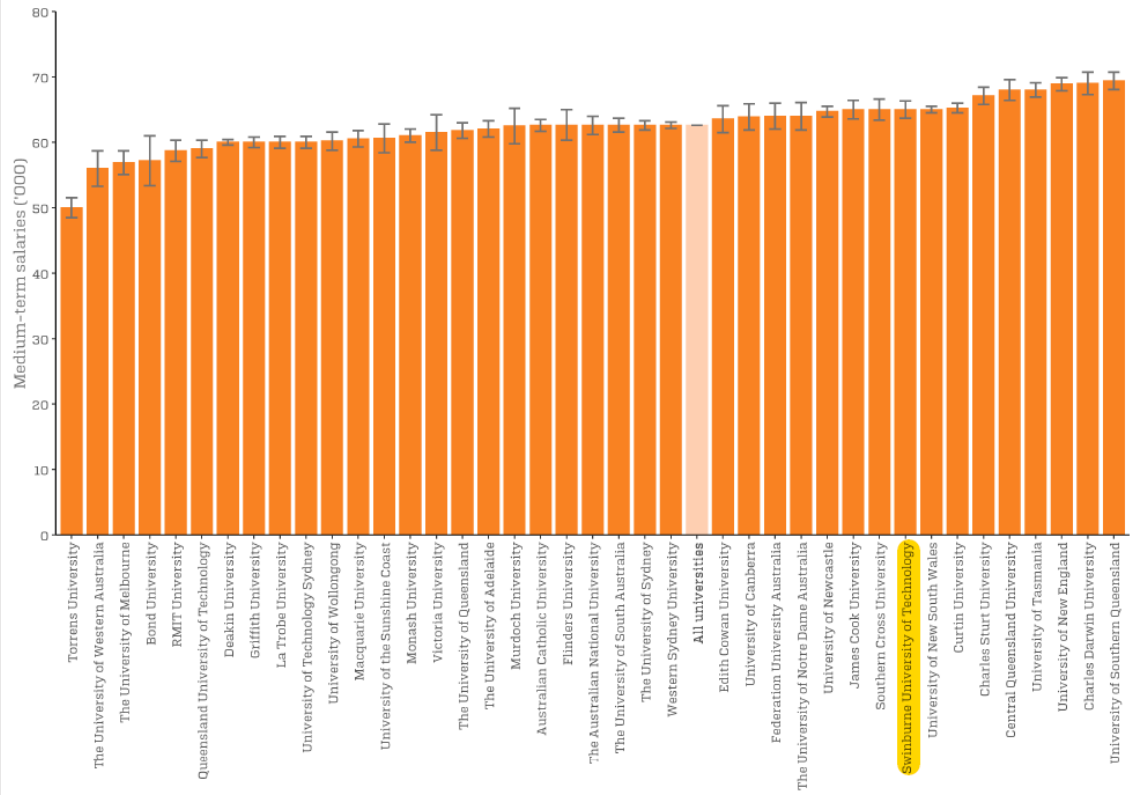
QILT data shows that our graduate's employability rate upon graduation is high.

- **72.5%** in full-time employment
- **86.0%** overall employed

Undergraduate Median Full-Time Salary in Australia

https://www.qilt.edu.au/docs/default-source/gos-reports/2019-gos/2019-gos-national-report.pdf

Median salary for Swinburne engineering graduates is $60k.



Mechanical and Product Design Engineering at Swinburne

Ranked Top 200

- ARWU (Academic Ranking of World Universities) in Mechanical Engineering in 2019 and 2020 (No 11 in Australia)
- Times Higher Ed in Engineering and Technology in 2020

Work integrated learning through industry placement

Work Integrated Learning and industry-related project work are key features of Swinburne's engineering courses!

Turning knowing into know-how

Options for our degrees:

- Professional Placements (paid)
- Professional Internships
- Industry-linked Projects
- Industry Study Tours

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Mechanical and Product Design Engineering at Swinburne

Practical curriculum developed in partnership with industry

A wide range of specialisations available through unique units of study offered by experienced staff

High employability rate upon graduation

Swinburne engineering graduates enjoy a higher than average employment rate (measured four months after graduation), i.e. **86.4%**. For Product Design Engineering, this has constantly been **> 90%** in the past years.

World-class laboratories

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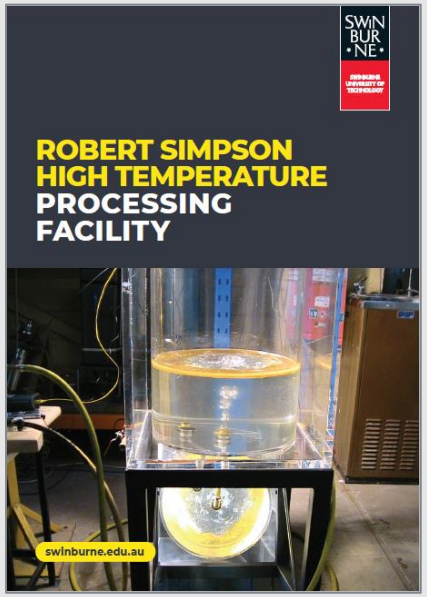
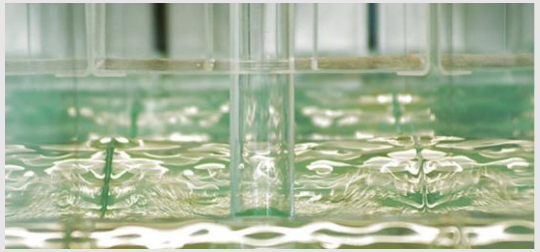
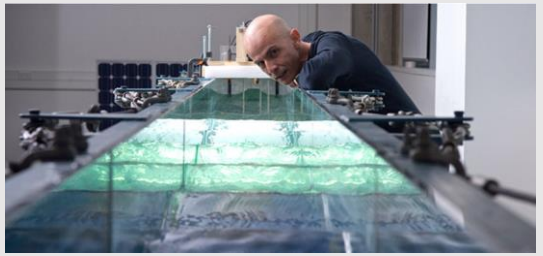
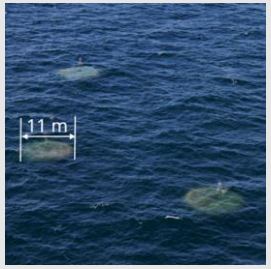
Mechanical Engineering Laboratories



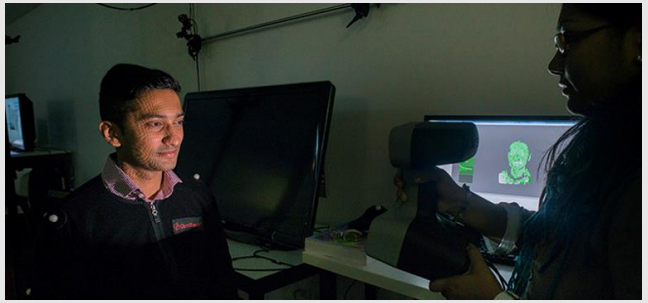
Energy Transformation Lab







Virtual Design Lab



Additive Manufacturing

Mechanical and Product Design Engineering at Swinburne

- 25 Academics

Professor	Associate Professor	Senior Lecturer	Lecturer
10	7	5	3

- 530+ undergraduate students
- 210+ Masters by course work
- 120+ postgraduate research students (PhDs and Masters by Research)

COVID19 Arrangements

- All lectures and tutorials will be offered online using tools such as Collaborate Ultra in Canvas.
- Essential practical sessions on-campus

https://www.swinburne.edu.au/alerts/coronavirus/

Questions

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