THE UNIVERSITY OF QUEENSLAND
AUSTRALIA
CREATE CHANGE

4th Year Thesis or Design Project
What to expect

ENGG4600 / ENGG4601 – Individual Thesis Project

ENGG4552 – Group Design Project

Aims of 4th Year Project Courses / Capstone Courses

Capstone Course - *serves as the culminating and usually integrative experience of an educational program.*

For engineers this means to bring together all you have learned, to complete a complex engineering project and to show-case your skills as an engineer.

Individual Thesis (ENGG4600 / ENGG4601) (formerly MECH4500/01)
In typical projects, you demonstrate your skills as an engineer by completing a project with a significant research component. This allows you to apply your engineering skills to advance knowledge or to apply engineering tools in a novel way so that new know-how is generated.

Group Design Project (ENGG4552) (formerly MECH4552)
As a group you complete a complex and multi-disciplinary engineering design project. This includes design, testing, and verification/validation. New knowledge is generated through the development of a new design solutions.

ENGG4600 / ENGG4601– What to expect….

The exact activities will vary significantly based on topic area and supervisor. The next slide provides some thesis examples.

You can expect the following common activities in a thesis project

1) Formulate a research question that will be addressed.
2) Conduct a literature review to become familiar with the topic area and to ascertain state of knowledge.
3) Formulate a plan of work that builds on existing knowledge and that addresses your research question.
4) Through experimentation, analysis, and/or simulation, generate new insight on your topic area.
5) Discuss, present, and report your findings.
6) Draw conclusions and make recommendations for future work.

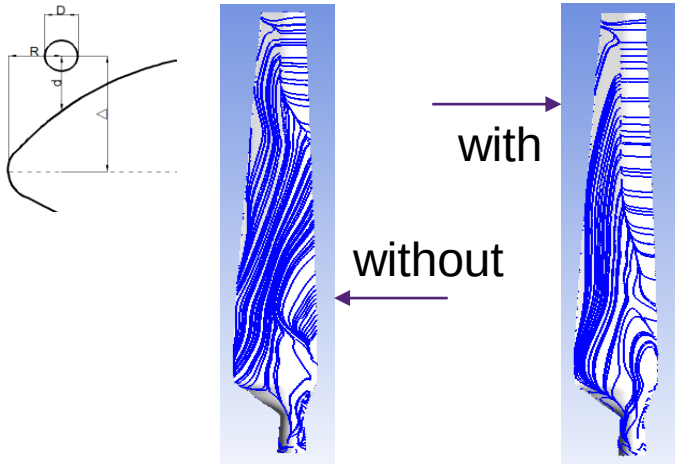
The execution of activities should highlight your ability to explore alternative concepts, to apply engineering rigor to evaluate these, and to draw clear conclusions.

Some Individual Thesis Examples

Simulation/Modelling Thesis

Research Question: Can placing a thin cylinder at leading edge of wind-turbine blade enhance performance?

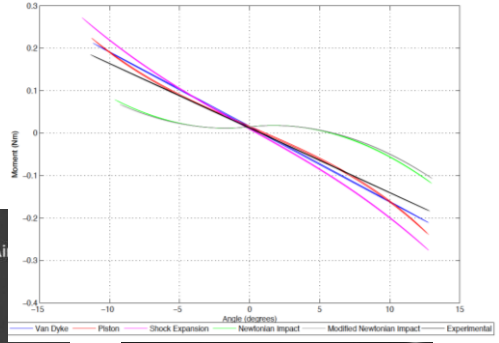
Solution: Identify most appropriate simulation approach (e.g. CFD), use this to simulate different configurations, analyse findings, draw conclusions.

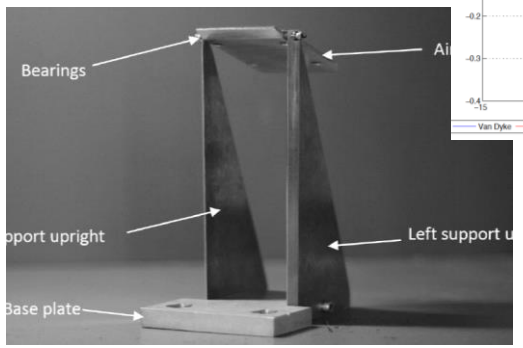


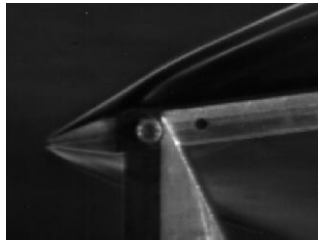
Experimental Thesis

Research Question: How accurate is piston theory for predicting fluid structure interactions in hypersonic flow?

Solution: Design a representative model and test this in a hypersonic wind-tunnel. Analyse the experimental data to generate new insight and draw conclusions.



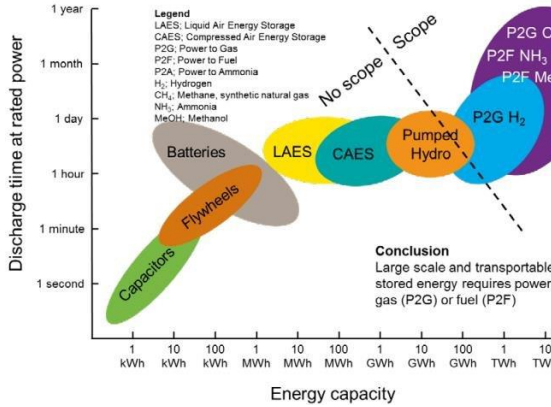




Literature/Data Analysis Thesis

Research Question: What technologies are best suited to provide frequency regulation and/or energy storage into our energy network?

Solution: Literature based reading following by a techno-economic assessment of competing technologies.



	Black Coal	Brown Coal	Natural Gas (OCGT)	Natural Gas (CCGT)	Hydro (24hrs storage)	Wind	Battery (4hrs storage)
Capital Costs ($/kW)	3299	5091	1294	905	2280	1893	2024
Fixed OPEX ($/kW/year)	62.12	80.56	4.91	12.26	18.68	42.05	9.34
Fuel Costs ($/MWh)	31.26	7.60	135.16	77.82	58.25[1]	-	62.40[1]
Variable OPEX ($/MWh)	4.92	6.15	12.3	8.61	-	3.11	-
Lead time (years)	8	8	4	5	4	2	2
Technical Life (years)	50	50	30	30	50	30	15

[1] *Values have been drawn from average cost of supply for 2019-2020 period from publicly available national electricity market data*

Table 27: Summary of costs for FCAS Providers [1, 15]

ENGG4552 – What to expect …

Exact activities will vary based on project you select. But broadly speaking you will complete the following activities during the year.

1) Work with an industry client to establish requirements to solve a current problem.
2) Apply design principles to establish functional requirements.
3) Using literature and research skills ideate multiple solution concepts.
4) Use analysis and/or testing to select a design idea to take to prototyping stage.
5) Present your ideas and preliminary design to review boards and client.
6) Complete detailed design and construct a prototype.
7) Through testing and simulation of your prototype, confirm that requirements are met.
8) Present and document your design and how it performs.

The design process, analysis applied during design, final prototype, and generated performance data should show significant depths of design thinking and engineering skills.

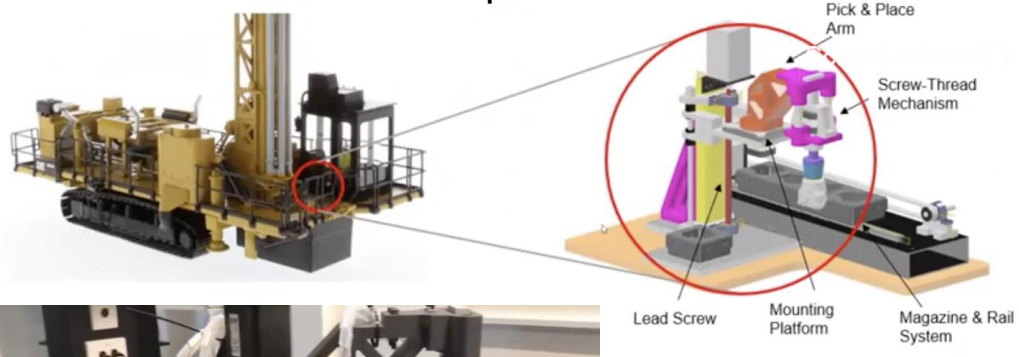
Some Design Project Examples

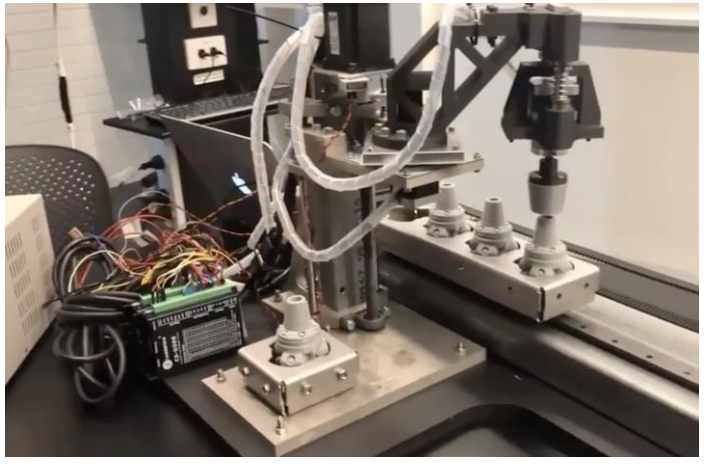
Automated drill bit changer

Client: THIESS

Problem: Develop an automated drill bit changer for Caterpilar MD6250

Solution: Developed and build a 1:3 scale prototype to demonstrate functional operation



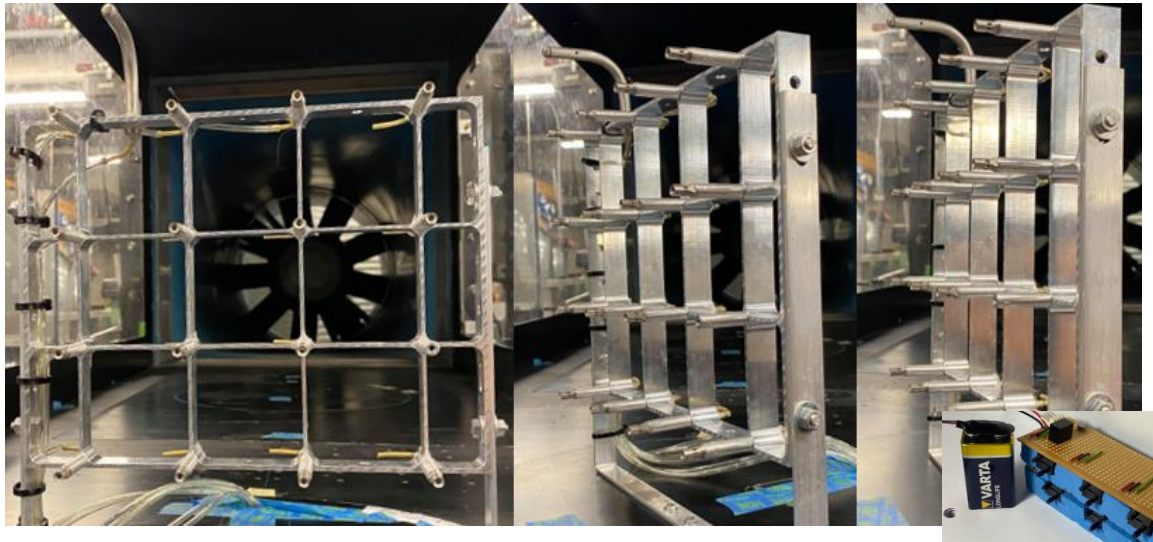


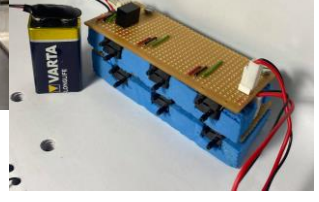
AeroRake for UQRacing

Client: UQRacing

Problem: Develop and verify system for measuring aerodynamic wake downstream of race car wheels or wings

Solution: Design, testing, and characterization of a 16 probe aero-rake. Wind-tunnel characterization showed high angle of attack tolerance for Kiel probes.





Finding a Project

Option 1: EAIT thesis database - https://student.eait.uq.edu.au/projects

- Projects are added periodically, so it is worth checking back from time to time;
- If you find a suitable project, email the supervisor to meet and discuss your suitability for the project.

Option 2: Contact supervisors directly – e.g. if you want a thesis is a specific topic area

- Use UQ Researchers, https://researchers.uq.edu.au/ to find a staff member that works in the area;
- Email the potential supervisor and see if you can create a suitable project.

Option 3: Propose your own topic or industry project (can be done for ENGG4600/01, ENGG4552, ENGG4013)

- Prepare a short proposal (introduction, aims, methodology, expected outcomes);
- Present proposal to suitable academic staff and/or course coordinators to identify supervisor.

Once you have a project and supervisor → Proceed to contact studentenquiries@mechmining.uq.edu.au with details about your project (Project Title, Supervisor Name, Student Number, Course code) to enroll.

Final Suggestions

For both thesis or the major design project, select a topic that:

- Is interesting to you;
- Is challenging; and
- Will allow you to hone in and demonstrate your engineering skills.

When you are in an interview for your dream job, talking about your thesis, that is relevant to the job, will set you apart from other applicants.

Important note:

23 November 2020 - Semester 1 and Semester 2 2021 enrolments open for students via SI-net.

Thesis enrolment process is available on the School website.

Frequently Asked Questions (General)

Q: I am unsure which option is best for me?
A: All options are good. There are many examples of people doing a design project and then proceeding to research and vice versa.
If you have career ambitions in a certain direction, try to find something that aligns.

Q: Where will I get better grades?
A: Find a project you are passionate about, that aligns with your desired career direction, and that you will enjoy. The experience gained in capstone projects gives you skills and experience to set yourself apart from other graduates.

Q: Can I do a PhD or Masters after doing a ENGG4552 Design Project
A: Yes you can. The ENGG4552 design project includes a number of research activities that assure you acquire the necessary research skills.

Q: Can I do both a ENGG4600 thesis and a ENGG4552 group design project?
A: No. The courses are not compatible.

Frequently Asked Questions (ENGG4600/01)

Q: What is the difference between ENGG4600 and ENGG4601?
A: They are identical. ENGG4600 starts in semester 1 and ENGG4601 starts in semester 2.

Q: How do I find a out about possible Thesis Topics?

A: Go to the thesis database and do a search. https://student.eait.uq.edu.au/projects/

Q: Can I propose my own thesis project?
A: Yes. Start discussing your project with potential supervisors. If they are willing to supervise you, you are ready to go.

Q: How do I enroll?
A: Once you had a discussion with a supervisor and they have confirmed that they are happy to supervise, you can email studentenquiries@mechmining.uq.edu.au and they will add you.

Frequently Asked Questions (ENGG4552)

Q: Can I start ENGG4552 at mid year?
A: No. Currently ENGG4552 is only offered with a semester 1 start.

Q: How do I find a out about possible Design Projects?

A: Go to the thesis database and do a search. https://student.eait.uq.edu.au/projects/ using the ENGG4552 keyword. Note: projects will be added throughout summer as we complete negotiations with industry partners.

Q: Can I do an individual design project?
A: Yes this is possible. Usually this is done as part of ENGG4600, you just need to find a suitable supervisor.

Q: Can I select which project I want to do?
A: Yes (almost always). There are some practical limitations for minimum and maximum number of people that can work on a given project. However, we usually find a solution for everyone.

Q: Can I do a project with my friends?
A: Yes.

Further questions?

About how to find projects / how to enrol / etc…

→ studentenquiries@mechmining.uq.edu.au

Specific questions about the courses

→ email respective Course Coordinator (see ECPs)

Contact SoMME UG Student Representative - Jared Dowling

My name is Jared Dowling and I am the Academic Officer for MESS in 2021. I am currently in my fourth year of studying a Bachelor of Engineering (Honours) and Masters of Engineering, majoring in Mechanical and Materials Engineering. My student experience has definitely been enhanced over these years from my involvement with MESS. It has provided me with chances to meet new people and form invaluable connections with my peers and also connect with industry representatives during networking events. My goal as a MESS executive this year is to give back to the new up and coming engineers, to provide them with as many, if not more of the great experiences that MESS offered me when I was starting out. Additionally, as a member of the School T&L Committee, I will be responsible for providing student feedback to help improve their learning experiences. The current challenge of online study allows a great opportunity to change and improve upon existing strategies to best suit the student's situations.

Email: careers.mess@uqeus.com.au