

# The Engineering Link Project

Year 11 and 12

## Gas Transport Project

### Chemical Process Engineering

In the Coal seam gas industry a complex issue is the transport of gas from the wells, where the gas is extracted from the ground to the processing facilities. This task focuses on the gas transportation to the compression station only.



*"It provided a really good insight into process engineering and also the steps in extracting gas".*



## Rationale

In this activity, you will be introduced to methods, processes and principles of process engineering design and analysis. The workshop brings together fundamental concepts within process engineering such as mathematics (Pipe volumetric flow and pressure calculations, thermodynamics and fluid dynamics, heat and mass balance calculations), design conception, innovation and adaptation of design to meet brief constraints, detailed cost analysis of pipeline routes, process flow diagrams, and hazard and operability study (HAZOP).

## Professional outcomes and links

While primarily using process engineering concepts, students are also exposed to processes common in cost engineering and project management.



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## Parachutes

Aerospace  
Engineering

Modern military aircraft have an ejector seat to let the pilot get out of the aircraft if the plane is in a bad way. This fires the seat away from the aircraft, the seat falls away from the pilot and descends to the ground under a parachute.

Your task will be to design a parachute for an ejection seat to ensure pilots land safely.

*“The thinking and the communication about the concepts and ideas and the opportunity to make things ourselves.”*



## Rationale

In this activity, you will be introduced to methods, processes and principles of aerospace engineering design and analysis. The workshop brings together fundamental concepts within the discipline such as mathematics (drag calculations and velocity at constant rate calculations), design conception, innovation and adaptation of design to meet brief constraints.

## Professional outcomes and links

While primarily using aerospace engineering concepts, students are also exposed to processes common in cost engineering, materials science, and project management.



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## Medical Device Innovation

### Medical Engineering

Your task will be to design and prototype an innovative medical device to improve the lives of many.



*“How simple materials can be manipulated to create life changing equipment for those in need while also implementing innovative ideas”*



## Rationale

In this activity, you will be introduced to integrating the fundamental engineering principles with human physiology, and the process of identifying a clinical need and how to select promising concepts for development in medical devices. You will apply these nearly learnt skills to designing and prototyping a medical device that improves health outcomes for those in need.

## Professional outcomes and links

While primarily using medical engineering concepts, students are also exposed to emerging technologies in medical device innovation.



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## Renewable Energy

### Electrical Engineering

You will look at real-world case studies, from household solar panels to large scale renewable energy farms to plan and deliver legislated renewable energy targets.



*"I really enjoyed it and it exceeded my expectations. Learnt a lot of new things about the industry."*



## Rationale

In this activity, you will look at the ever-increasing global demand for renewable energy and the impact of small and large scale renewable energy systems on the existing grid. Using real-world case studies you will plan and deliver us to meet our targeted net zero emissions.

## Professional outcomes and links

While primarily using electrical engineering, students are also exposed to concepts in design and project management.



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## Mars Rover Vehicle

Mechanical Engineering

Design and build a 'Rover' Electric Vehicle capable of operating in harsh environments using Lego Technics. Students must operate the vehicle at a set velocity so that surface scanning equipment can operate correctly, and be able to winch rock samples in the fastest possible time.



*"We designed it ourselves and got to compete against other teams so we can see how we went."*



### Rationale

In this activity, you will be introduced to methods, processes and principles of mechanical design and assembly. The workshop brings together fundamental concepts within mechanical engineering such as mathematics to analyse viable components (torque, gear, and power calculations), design conception, innovation and adaptation of design to meet brief constraints, technical data and performance curve analysis, and building and testing proof of concepts.

### Professional outcomes and links

While primarily using mechanical engineering concepts, students are also exposed to design processes and creating a complex machine to meet several criteria.



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# The Engineering Link Project

All year levels

## Sugar Cube Retaining Walls

Civil Engineering

In a small team, you will design and construct a small retaining wall out of sugar cubes to be load tested.



*"I loved applying basic principles from school to real-life engineering concepts."*



## Rationale

In this activity, you will be introduced to methods, processes and principles of engineering design and construction. The activity brings together fundamental concepts within applied engineering such as mathematics (static, dynamic and friction force equations, moment equations, trigonometry, density, and pressure), design conception, innovation and adaptation of design to meet brief constraints, cost-benefit analysis, and building and testing proof of concepts.

## Professional outcomes and links

While primarily using civil engineering concepts, students are also exposed to processes common in structural engineering, cost engineering and project management.



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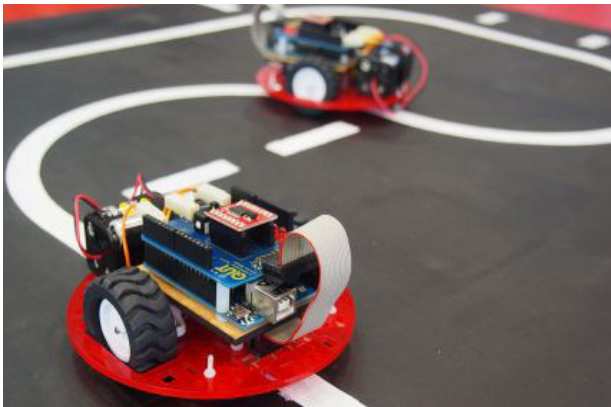
# The Engineering Link Project

Year 9 and 10

## Arduino: cars of the future

Mechatronics  
Engineering

Using Arduino and robot kits, students create fast-acting robots that drive themselves.



*“Got to learn another coding language changed my perspective on coding.”*



## Rationale

In this activity, you will be introduced to the basics of programming logic and processes, to navigate a driverless car round a track. Students are introduced to microcontrollers and their place in the real world. They learn the basics of programming language, terminology and formalities, such as libraries, variables, for loops, if statements, syntax and pseudocode, and apply their knowledge to program an LED to blink.

## Professional outcomes and links

While primarily using mechatronic engineering concepts, students are also exposed to MATLAB programming to demonstrate model-based design, control systems and image + signal processing.



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# The Engineering Link Project

Year 9 and 10

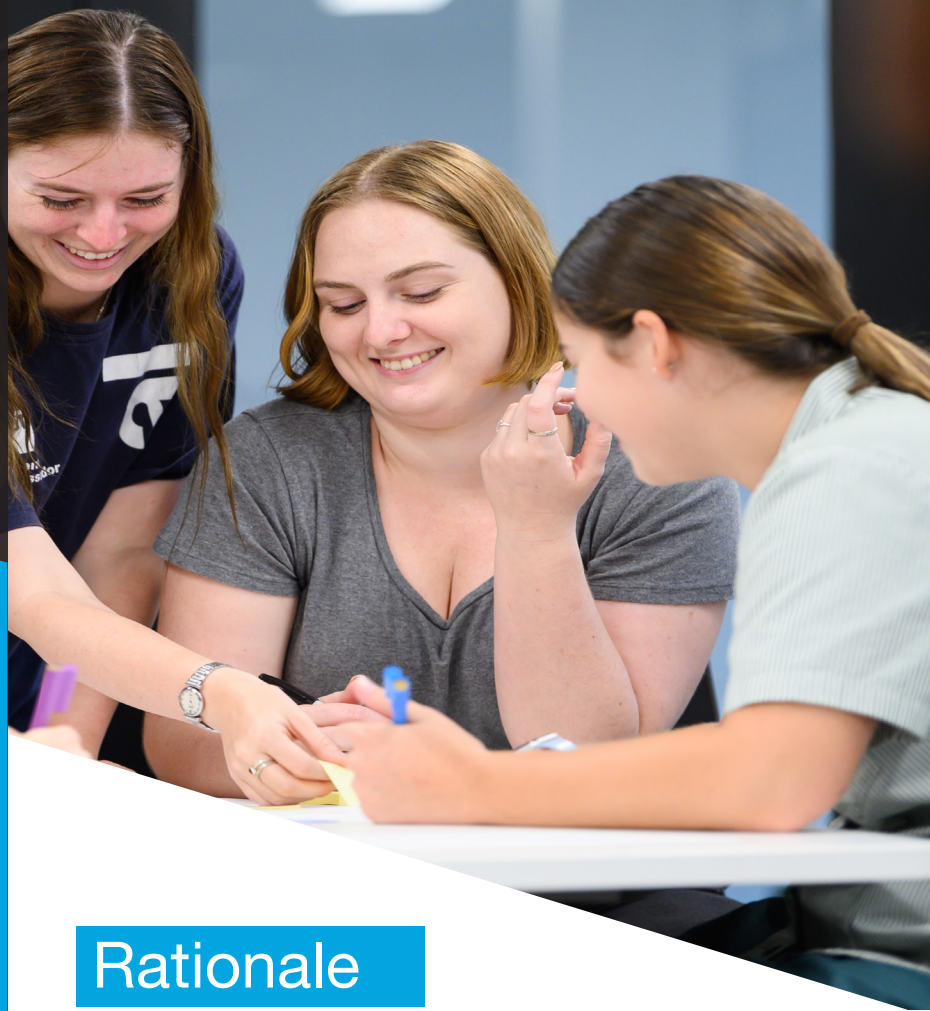
## Engineering real-world project

multi-discipline

Working on a real-world case study, this project is a multi-field engineering project where students work on a new green bridge project.



*"It was fascinating, really fun and hands-on as well as being challenging. Amazing!"*



## Rationale

In this activity, students will work together on to engineer a more sustainable city. As part of a new consultancy start up, students will act as planners, designers, engineers, and builders, working together on a green bridge project. They will plan, design and build a green bridge from Lego, before pitching to their community. This project replicates a real-world scenario showcasing team work in multi-disciplinary projects while also introducing the concept of sustainable cities.

## Professional outcomes and links

This is a multi-field consultancy project, students are exposed to various engineering disciplines as well as design and project management concepts.



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