

Engineering Link Project

<http://telg.com.au/programs/elp/>



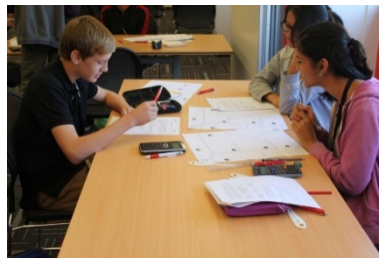
**ENGINEERING
LINK GROUP**

Forging links between
school and industry

Rationale:

There are several projects across Australia that work with primary and middle school students, but very few focus on inspiring senior school students. The Engineering Link Project, established in 1994, has two main foci:

- Demonstrate to students that the concepts they are learning in school are relevant by providing hands-on projects. That is, answer the “why are we learning this?” question.
- Allow students to work with professional engineers to help them understand what the engineering profession is really like from the people currently living it.



ELP modules all encompass the following characteristics:

- Providing a real situation/problem that engineers face in their work.
- Teaching the students any content/skills they need
- Test materials, complete calculations and design a solution. This is presented to the engineer.
- Construct their solution
- Test their solution against the criteria/constraints and evaluate

The key is that the students are **DOING**, not just **WATCHING**.

Students:

Students from Years 10, 11 and 12 are welcome to apply to attend. It is strongly recommended that they be studying a combination of:

- Physics
- Mathematics
- Engineering Studies/Technology
- Chemistry

Students should have an interest in science and mathematics.

Teachers:

We encourage STEM teachers to attend as observers. They will also be asked to support the engineer as and when needed, and provide crowd control (not the engineer’s job). Behaviour management is rarely required, as the students want to be there, and the projects are interesting and engaging.

Engineers:

The time commitment is from 9.00 am, with the students starting at approximately 9.30 am, through to approximately 3.30 pm (lunch included and provided).

Each engineer will be provided with an activity from TELG's module library, if required, along with support materials before the event. Where possible and practical, a member of TELG's staff will meet and go through the activity, materials, facilities and other important aspects of the day.

The engineer is encouraged to choose their level of involvement on the day. From experience, the most effective is where the engineer facilitates the day, supported by a teacher (and undergraduate engineer ambassadors from the host university where available). However, depending on the confidence and experience of the engineer, that involvement can be scaled back to technical consultant, with a member of TELG staff facilitating the Project.



Benefits for Engineer / Engineering firm:

- Brand recognition in the local community –
 - Company logo will be promoted on all literature related to that event.
 - Access to the students post-event (with permission), through TELG
- CPD for this event can be obtained if required (Engineers Australia approved)
- Public Speaking and communication experience.

Format of the ELP:

Across the two days of the project, students will participate in two different engineering disciplines, one per day. Students make their selections before they arrive. Each day follows the same format.

A day is broken into smaller sections (times are indicative only and are adjusted as required):

- (30 mins) Engineer introduces themselves and talks about their career, how they got to where they are, their career (and personal if appropriate) influences and what their particular engineering discipline is all about, from their perspective. A short presentation (PowerPoint or equivalent) is very effective here, including pictures of projects (where possible and appropriate).
- (60 mins) Engineer introduces activity and outlines what the students will be doing, as well as providing any background information about the concepts (TELG helps a lot here, with presentations and the like).
 - It is important that the activity is broken up into steps / stages for the students to follow. Again, the supporting teacher/TELG staff can assist in planning this if required).

Morning break (15 minutes)

- (60 mins) Student design their solution, doing any calculations and drawings necessary. Show the engineer their design to help ensure it is satisfactory and meets design requirements.

Lunch (45 minutes)

- (120 mins) Final submission to the engineer, including any changes required. Once approved, construction of solution.
- (60 mins) Test and evaluate their solutions against the criteria, then engineer provides an evaluation and debrief.
- (30 mins) Tour of the facilities.

TELG Modules Available:

TELG will supply the module, and all materials. We are always interested in any suggestions and improvements you may have. All of our activities are tried and tested, but there is always room for improvement. Note: *We don't have activities for every discipline.*

TELG is always looking to expand its library and welcome the opportunity to work with engineers to design activities in disciplines not represented below, or to expand the repertoire of the current disciplines.

Aeronautical Engineering:

- Parachutes – design a parachute to safely bring an egg to the ground, without using padding on the egg.
- Rocket Launch – using Kerbal Space Program (KSP) software, design a rocket that can reach orbit, and then return it to the ground

Chemical Engineering:

- Gas Pipeline – plan and design a gas pipeline.

Civil Engineering:

- Geotechnical – design and build a model retaining wall (using sugar cubes)
- Structural – design and build a model crane that can hold a given mass in two positions, while sitting on an unstable base (jelly)
- Bridge – design and build a bridge to span a 2.5 m gap, using only string and short pieces of timber

Electrical:

- DC Motor Control – design a rectifying circuit to convert AC to DC, then design a second circuit to control the RPM of a motor at two different speeds.
- Project Management – in small teams, design and build a model electricity distribution network, from generation to distribution. The electricity is modelled by ping pong balls.

Environmental:

- Water Treatment – test various water treatment processes, then construct a treatment plant.

Mechanical:

- Hydraulic Arm – construct a model hydraulic arm to move items from one place, across a barrier, to another.
- Gearing – calculate the appropriate gear ratio to move a Lego vehicle 2 metres in 10 seconds.

Mining:

- Drag Line – design and build a model drag line.