Advanced Technology Project: highlights from 2012

The South Australian Advanced Technology Project is a joint initiative of the Commonwealth and the State governments that aims to increase the number of students studying science, mathematics and technology.

The Advanced Technology Project is funded by the Defence Material Organisation.

The Advanced Technology Project capped-off 2012 with all of the 19 project schools presenting their curriculum assessment tasks to each other at the Education Development Centre in Hindmarsh. It was exciting to hear high-level conversations from each school’s STEM (science, technology, engineering and mathematics) team about their curriculum approaches and the opportunities to collaborate and share resources.

Industry recognised at Defence Teaming Centre function

More than 150 people gathered on the lawns of the Naval Military and Airforce Club on Hutt Street in December 2012 for the Defence Teaming Centre’s Christmas networking function.

It was a ‘who’s who’ of the South Australian defence industry with the Hon Jack Snelling, Minister for Defence Industries, Andrew Fletcher, Chief Executive of Defence SA, and representatives from over 90 companies.

The Advanced Technology Project took this opportunity to acknowledge four companies that have provided outstanding support throughout 2012:

**Broens SA**: dedicated to the design and manufacture of aerospace components including large airframe and engine systems. In 2012 Broens supported more than 30 students in the northern area with one-week work placements in their metal engineering training facility.

**Raytheon**: located at the RAAF base at Edinburgh is the leading provider of avionics maintenance and engineering services to the Australian Defence Force across multiple aircraft platforms. Raytheon has developed a productive partnership with Craigmore High School. A design and technology teacher from Craigmore took on a work placement to investigate the skills and competencies that Raytheon look for in their young employees. The company also hosted a site visit for teachers and five Craigmore students in one-week work placements.

**Lockheed Martin**: its business activities span the aeronautics, maritime, surveillance, defence systems and civil information technology domains. The company has been working closely with Valley View Secondary School for the past two years with its global program, Engineers in the Classroom, to assist teachers and students understand the various career options in engineering.

**Hendon Semiconductors**: a South Australian-based company specialising in the design and manufacture of microelectronic products for markets where electronics is a key technology. The company has formed an excellent relationship with Henley High School over the past two years and has hosted industry tours for teachers and electrotechnology students on structured work placements.

Staff from the partner schools including: Liz Schneyder and Sandy Moran from Henley High School; Bob Haskard from Valley View Secondary School; Cheryl Ball from Craigmore High School; Celina Bolding from St Patrick’s School; and Heather Bitter, the Northern Region’s Industry Skills Manager, also attended the function.

A big thank you to the Defence Teaming Centre for allowing us to take advantage of this great event to show our support with a presentation to these industries.
Advanced Technology Project: highlights from 2012 (cont.)

Since taking on the Advanced Technology Project in 2009, lead schools have recorded a 5-10% increase in participation of senior science and maths. This increase is based on data that has been collected each semester since 2009, a process that will continue into mid-2014. It allows the project schools to individually compare their progress against each other and non-project schools in their region. The increases can often be attributed to an enthusiastic team of STEM teachers, who are mentored by a senior leader, with support from their Principal. These schools view the Advanced Technology Project as an important opportunity to increase the profile of STEM.

Also in 2012, the Defence Materiel Organisation approved a proposal to change the way selected partner schools of the project are funded in 2013. Additional resources will be provided to selected partner schools to increase their capacity to accelerate their programs. The selected partner schools are:

- Golden Grove High School
- Gleadstone College
- Pedare Christian College
- Craigmore High School
- Unley High School
- Blackwood High School
- Hamilton Secondary College

Developing community partnerships remains a significant challenge for project schools and their management teams. It was exciting therefore, to recognise four significant industry/school partnerships established in 2012. (see page 1)

Enthusiastic Year 10 student wins favour with Broens SA

Craigmore High School student, Daniel French, is an ordinary 16 year old. Or is he?

In Year 10, Daniel enjoyed metalwork so much that his teacher suggested he undertake a work experience program with Broens SA*. Based in the northern suburbs, Broens SA designs and manufactures aerospace components, including large airframe and engine systems.

Daniel quickly realised the work experience he was doing at Broens SA was both something he loved and something he was good at. He began with one week of work experience, and then went back a second time.

"The staff at Broens made me feel welcome and I loved going there," Daniel said.

"I made some cool things like a pair of dice, a spring divider and a three dimensional puzzle." Jos Verschuren from Broens SA said that Daniel showed enthusiasm right from the start.

"He was always on time, he fitted in well with the team and picked up new information very quickly," Jos said.

"I practically had to push him out the door every night."

Jos added that when Daniel came in on a Monday morning with a big smile on his face, and left on a Friday afternoon with the same big smile, "then we knew we were on a winner."

"I didn’t know I was that good at metal work but with Jos’ help I surprised myself," Daniel laughed.

Daniel hopes to take up a school-based apprenticeship with Broens SA while he completes Year 12 and eventually become a machinist with the company.

His advice to other students thinking of doing work experience is to “just go for it – give it your best and do everything right.”

Broens SA hosted 28 students in 2012 on a one-week structured work placement and has recently committed to continue the program this year. This is particularly generous given the difficult economic conditions in the defence industry at this time.

In December 2012, the Advanced Technology Project recognised Broens SA for their continuing support and commitment to the project. (See page 1)

* Broens SA is a subsidiary of Broens International, one of the world’s most advanced, high-tech engineering companies.
Lockheed initiative extended

The Advanced Technology Project is proud to announce that Engineers in the Classroom, an initiative of the Lockheed Martin Corporation, will be extended to a further two regional schools in 2013.

Engineers in the Classroom connects teachers and students with real-life engineers. It aims to identify, develop and inspire students into pursuing careers that require study in science, technology, engineering, and mathematics (STEM) courses.

For the past two years, Lockheed Martin has successfully administered this initiative in Valley View Secondary School. The engineers work closely with teachers to develop workshops for students in aerospace, mechanical and software engineering domains.

The initiative allows students to experience engineering through hands-on activities, interactive presentations and meetings with Lockheed Martin engineers, while at the same time allowing the engineers a great opportunity to inspire future generations of their workforce.

In 2013, Lockheed Martin will extend the initiative to Salisbury East High School and Craigmore High School. Members from Lockheed Martin have met with key teachers at both schools to scope a program that fits in with their requirements. They are planning to run aerospace and software sessions in Term 4.

Based on feedback received from Valley View Secondary School, Lockheed Martin has expanded the engineering initiative to include several technicians as part of the program, where they share their career pathway story with students. The company also advised the school about the layout and equipment-needs of their recently completed Trade Training Centre.

Lockheed was one of four companies recognised for their support to the Advanced Technology Project at the Defence Teaming Centre’s networking function (see page 1).

“We must inspire today’s young people to believe that if they become our future engineers, they can engineer our future.”

Robert J. Stevens, Chairman & CEO, Lockheed Martin Corporation

*Lockheed Martin Corporation is an aeronautics, maritime, surveillance, defence systems and civil information technology company.

LEGObots take over Pedare Christian College

Students at Pedare Christian College are refining their design skills via the use of Robotic LEGO kits, funded by the Advanced Technology Project.

Being involved in the Advanced Technology Project has seen a surge in the number of students studying information and communication technologies, with Robotics offered in Year 8 and Mechatronics in Year 9. Students are enjoying being engaged in the subject and teachers are enjoying the opportunity to integrate STEM subjects.

During their science and mathematics classes, the students that have worked with the robots share the skills they have learnt with those that haven’t yet had the opportunity. The robots are helping students gather real mathematical data and develop graphing and trigonometry techniques as part of their course.

Year 8 science classes are exploring ways of using the robots to improve a simple machine, while Year 9 students are investigating the use of robotics in biomedicine. And staff and students were fortunate to participate in workshops by a visiting robotics expert, Damien Keys.

Staff and students of the college were also invited to visit the University of South Australia’s new mechatronics laboratory at the Mawson Lakes campus. Teachers in technology, mathematics and science attended professional development sessions with university staff on the use of the 3D printers, which will assist them in integrating this technology into the curriculum.

Pedare Christian College is again competing in the FIRST LEGO League Robotics Challenge, run by BAE Systems, to further extend the students’ problem solving and IT skills. The challenge involves three elements – the Robot Game, Project, and FIRST LEGO League Core Values. All the very best to the students competing in the challenge.

Pedare tries speed dating

Pedare Christian College recently trialled the concept of ‘speed dating’ as part of its Year 10 Career Expo.

‘Speed dating’ involves the students meeting with people from a variety of career backgrounds for 10 minutes discussions. During this time, the students hear about their presenters’ career and ask questions before moving on to the next ‘date’.

Leonie Brown, science and Advanced Technology Project coordinator, said the activity was a great success for both students and presenters.

“We’ve had a positive response from past students, parents and the community who want to be involved in the presentations for students next year,” Leonie said.

“Students came away with ideas of what they wanted from their future career, which helped guide them in their academic pathway, as well as the personal skills that will be required by their employer.”
Science Fair 2012

The inaugural Southern Science Fair was held in August 2012, which gave South Australian students a vision of the exciting world of science.

Held in the former Mitsubishi canteen at the new Tonsley Park development site, the fair involved secondary school students from the southern region sharing their science lessons with local Year 7 students and industry representatives.

Year 8-11 students from Aberfoyle Park High School (Advanced Technology Project lead school for the Southern Region), the Australian Science and Mathematics School (ASMS), Blackwood High School, Hallett Cove School, Hamilton Secondary College, Reynella East College and Unley High School showcased problem-based learning activities such as kinetic cars, robots, bridge building, rubber band cars, earthquake simulation and gel electrophoresis.

All displays, posters and oral presentations were considered high quality.

The Year 7s were invited to judge the People’s Choice award, which they did by completing a simplified survey after they toured the interactive displays.

Industry representatives from Flinders University, TAFE, ASMS and Aberfoyle Park High School voted on the Judge’s Award.

Each school received a participation certificate and the winning school from both categories received a trophy and a winner’s certificate.

Winners were:

Judge’s Award – Aberfoyle Park High School
Judge’s Award Runner Up – Hamilton Secondary College
People’s Choice Award – Aberfoyle Park High School
People’s Choice Award Runner Up – Australian Science and Mathematics School

Russell Johns, a teacher and assistant principal at Aberfoyle Park High School, commended the science fair.

“It was fantastic to see the interest and enthusiasm shown by students who were keen to share the knowledge and understanding they’d developed through their own research and design of their projects,” Russell said.

“The science fair was a lot of fun and also a great learning experience,” said Year 9 Aberfoyle Park High School student, Ebony Bigrmore.

The fair was the culmination of many weeks of work by the secondary school students, supported by their science, mathematics and technology teachers. It enabled them to share their learning with budding scientists and mathematicians.

Liz Mead, Principal of Aberfoyle Park High School, wants the fair to continue in the future.

“The passion of students was evident as they explained, demonstrated and interacted with younger students and the expert judges,” Liz said.

“We’re hoping this event becomes an annual recognition of the work being undertaken by the Southern DECD secondary schools.”

Participating schools were supported and sponsored by the Advanced Technology school industry pathways program.

University support in the north

The University of South Australia has been a major partner in the Advanced Technology Project, particularly Deb Turley, UniSA’s College Pathways Manager, who has developed specific professional learning opportunities for teachers and workshops for students.

In 2012, there was a focus on exploring new technologies and supporting teachers to change learning activities that engage students in science, mathematics and technology.

David Chan, Research Assistant at UniSA’s Division of Information Technology and Engineering, worked with Deb to help teachers gain the skills and knowledge. One example is 3D printing, otherwise known as additive manufacturing.

David set up student workshops, and professional development and individual technical advice for teachers. In the student workshops, participants were able to quickly build a prototype of their complex 3D design in various colours. Low-cost hobbyist 3D printers are now readily available for schools, allowing them to experience the future of complex manufacturing.

Teachers and students were also able to explore several other workshops, such as data acquisition, and plans are now underway for professional development opportunities for teachers in electronics and mechatronics.

On behalf of the Advanced Technology Project teachers and students, I would like to thank both Deb and David for their contributions in 2012. It was greatly appreciated.

Written by Steve O’Connor, Manager, Advanced Technology Project
Budding engineers from high schools across the state showcased their mathematics, science, technology and teamwork skills at the inaugural Sustainable Engineering Challenge.

The event was hosted by the University of Adelaide's School of Mechanical Engineering, with support from the Advanced Technology Industry School Pathways program.

Developed by Dr Cristian Birzer from the School of Mechanical Engineering, the challenge involved teams of Year 9 and 10 students competing in designing and building wind turbines for energy production.

The University of Adelaide provided teams with access to engineering mentors who worked to support teachers and students.

The challenge demonstrated 'real world' applications of science, mathematics and technology within the context of a renewable energy system.

The challenge required teams to build a wind turbine that produced maximum power, as determined by an electric generator, over a range of wind speeds. They had to test turbines to find the best angle, number and length of blades.

The teams brainstormed their own ideas and developed four possible designs. Over the next three months, each design was evaluated on power, wind velocity and temperature. One design was then built, tested and submitted for the challenge.

The teams spent five weeks as part of the Advanced Technology Project researching, designing, constructing and testing their wind turbines for the challenge. They are to be commended for their work, which saw them integrating their knowledge and skills from science, mathematics and technology.

While the challenge was centered on sustainability, the skills learnt are transferrable throughout many areas of the defence industry.

The finalists, teams from Pedare Christian College, Underdale High School, Woodville High School, Henley High School, Aberfoyle Park High School and Hamilton Secondary College, tested their creations in the University of Adelaide's wind tunnel and presented their ideas and research to a panel of their engineering experts.

The university also gave the students and teachers a tour of the engineering and laboratory facilities.

Finalist wind tunnels were on display at MechExpo 2012, the university's mechanical engineering expo, where Jayden Putland, Ben Schofield and Toby Ray Zwar, from Aberfoyle Park High School, were announced as the winners of the challenge.

MechExpo is where University of Adelaide’s 200+ mechanical, aerospace, sustainable energy, sports and mechatronic engineeringHonours students showcase their year’s work. More than 60 interactive projects were included in MechExpo 2012, which provided an opportunity for Advanced Technology Project students to meet and interview the engineers of the future.

Science and engineering alive at Hamilton

As part of National Science Week 2012, Hamilton Secondary College hosted a Science and Engineering Expo. Pioneered by Karen Palumbo, a science teacher at the school, the expo aimed to engage visitors in science and engineering now, and into the future.

The expo was attended by students from five primary schools, as well as those specially invited by Hamilton Secondary College, and they were able to participate in the engaging and hands-on activities on display. While the Hamilton Secondary College students showcased their innovative projects and whiz-bang science demonstrations, the guests got the chance to experiment with colour changes, frothing, fizzing and explosions.

The science expo was also designed to support students’ transition from the primary to secondary school environment.

University and industry representatives managed stalls with links to science, technology, engineering and mathematics (STEM) areas.
Student Learning Showcase

The final Student Learning Showcase workshop for the Advanced Technology Project lead and partner schools was held in December 2012. It was also an opportunity for participants to build a network of support for the next phase of the Advanced Technology Industry School Pathways program.

The workshop began with the 19 participating schools presenting the assessment tasks they had designed for their Advanced Technology curriculum. The assessment task outlines and the assessment tools were linked to the relevant curriculum framework and were supported by examples of student learning.

Several schools invited students to attend the showcase. Students from Henley High School and Pedare Christian College provided an articulate summary of their learning that fully engaged the teacher audience.

The workshop ended with the teachers showcasing their projects to key stakeholders from industry, tertiary and schools, and talking about how they could move their projects forward.

Each school submitted copies of their digital resources and these will be further refined and made available to schools in a DVD and web format in 2013.

Congratulations to all of the teachers who attended. A special mention goes to Jayne Heath and staff from the Australian Science and Mathematics School who assisted in organising the Student Learning Showcase and delivering the professional development for 2012.

Written by Steve O’Connor, Manager, Advanced Technology Project

Hendon and Henley partnership

The working relationship between Hendon Semiconductors* and Henley High School has recently reached its two year milestone.

They began working together to provide valuable industry skills and knowledge in a genuine industry environment to high school students, aiming to support their electrotechnology learning and career journey.

In 2012 five students took part in structured a work placement, as part of a week-long program to equip students with a variety of aspects of experience in the company.

“The students returned with a great sense of achievement and felt like they completed something meaningful and useful,” said Angelo Plantadosi, design technology teacher at Henley High School.

Maths, science and technology teachers were also given tours of the facilities, which, in turn, allowed them to bring valuable working knowledge and practices back to their classrooms.

Hendon Semiconductors is Henley High School’s industry advisor and contact for pathways in Certificate 1 Electrotechnology, Certificate II Electronics and Certificate II (Partial) Metal Engineering. The company provides valuable feedback to teachers and trainers on skills and knowledge required to take advantage of career opportunities in the industry. Partnership discussions ensure rigor to the teaching and learning program for all associated VET courses.

Arthur Jones, General Manager of Hendon Semiconductors, also participated in a teacher professional development day as an industry representative.

Hendon Semiconductors was one of four companies recognised for their support to the Advanced Technology Project at the Defence Teaming Centre’s networking function (see page 1).

* Hendon Semiconductors is a South Australian-based company, specialising in the design and manufacture of microelectronic products for markets where electronics is a key technology. These products include integrated circuits (silicon chips) in Bipolar, Bi-CMOS and CMOS technologies, thick film hybrids (ceramic substrate) and surface mounted printed circuit board assemblies and modules.

Talking tech at MechExpo

MechExpo* is a great opportunity for South Australian students and teachers to interact with Adelaide University mechanical engineering honours students to view and discuss their final-year project.

More than 180 Advanced Technology Project (ATP) students and teachers from seven schools attended the expo in October 2012 and were addressed by Cristian Birzer, a lecturer with the university’s School of Mechanical Engineering.

With more than 60 interactive projects on display, each exhibit represented the culmination of a full year’s work by the university students and reflected the diverse opportunities available in the field of engineering.

The aim of the school visit was to investigate the range of tertiary studies and engineering career pathways available, and the skills and teamwork required for the final-year honours project. This experience helped the students connect real-world engineering applications with the study of science and mathematics.

On the day the ATP students undertook a Student Activity Task, which involved them forming groups and analysing and evaluating one of the engineering projects on show. They interviewed the university students and asked them questions about their studies and their project. They then submitted their findings to the ATP team for judging.

The winning teams came from Blackwood High School (design and analysis of a hypersonic x-plane), Golden Grove High School (light and efficient ornithopter), and Hamilton Secondary College (collaborative autonomous underwater vehicles – Marco Polo).

*Please refer to Sustainable Engineering Challenge 2012 (page 6) article for further explanation of MechExpo.