

## Executive Summaries

### 2010-2011 Bursary Vacation Placements in 'VICTORIA'

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**STUDENT:**           **Mehmet Arslan (RMIT)**

**COMPANY:**         **AEMO**

Over the period of December 07 2010 – February 28 2011 I was employed at Australian Energy Market Operator (AEMO). I began my employment with the Network Analysis group where I was required to develop Python scripts that would allow addition of new network augmentations more efficiently. Once I completed the python scripts I spent the rest of my time with the Network Models group where I developed tools that would help in the preparation of 5 state base case load flow models for planning studies.

The tools I developed are:

- The economic dispatch data, which is used to dispatch generation economically.
- The optimal power flow data, which is used to keep voltages of buses within reasonable limits.
- The shunt settings script, which sets voltage limits for shunts to prevent conflict between transformer tapping and switching of shunts.

To modify the 5 state base case with a higher load the user can;

1. Scale the load
2. Adjust inter-area transfers
3. Run Economic dispatch
4. Run Optimal Power Flow
5. Set shunt voltage controls

Previously all these processes would have been performed manually which is inefficient and time consuming. During my employment I was exposed to Power Factory and PSS/e. I found that for dynamic simulations Power Factory was easier to use. However for other studies on large networks, such as the Australian electricity network, PSS/e is more user friendly.

Through my employment I have gained knowledge and have a greater understanding of the role of a power systems engineer. I have realised once again, the value of experiential learning to complement the theory I have learned at university. My technical understanding of the Australian energy network, both gas and electricity networks, has greatly increased.

Overall, my experience at AEMO was extremely valuable; it showed me what power engineers do on a day-to-day basis. The power system simulation software experience as well as knowledge gained from AEMO's employees is definitely a head start in the industry as a student engineer.



**STUDENT:**           **Shaun Pereira (RMIT)**

**COMPANY:**         **AURECON**

Over the period of mid November to end of February, I was placed in the Energy group of Aurecon's Melbourne office. Aurecon Group is a leading, global and vibrant engineering firm that has operations in numerous continents around the world, with emphasis on the Australian Pacific (APAC) region, as well as Africa and the Middle East (AME) regions. The group, while small in size, tackles a wide range of electrical engineering related projects. These range from rail traction projects, data centre and UPS projects, as well as telecommunication infrastructure and high voltage engineering. I was tasked with designing an earth grid for protection of a mobile phone antenna array mounted on the structure of a 500kV transmission line. This involved visiting to the site to measure earth resistance and simulating fault conditions on the 500kV to determine fault currents. Once initial data were gathered, these were utilised in software packages to develop an earth grid arrangement that would offer sufficient protection for staff and equipment at the site if a HV line to ground fault occurred. Following this, a statistics based approach to risk management was taken, utilising information from the earth grid design to determine if the risk of fatality was negligible.

Being exposed professional engineering design methodology, software packages and industry standards has also contributed to my understanding of professional engineering. In some ways, professional engineering is similar to the university setting, as well as markedly different in respect to the thorough verification and client interaction required.

Having completed a valuable placement at Aurecon, I will resume my studies with a greater appreciation for the varied work that is performed by electrical engineers.



**SP AusNet**

*A member of the Singapore Power Group*

**STUDENT:** **Ross Jackson (RMIT)**

**COMPANY:** **SPAUSNET**

As part of the API bursary program I was fortunate to obtain six weeks of summer vocation employment at SP Ausnet in Melbourne. During that time, I worked with the Lines Development and Planning team and was mostly tasked with assisting my supervisor Sanath Peiris with his work in providing plans of development in the central region of SP Ausnet's vast distribution network in Eastern Victoria. My main tasks were to develop sophisticated spreadsheets that greatly improved the efficiency of completing time consuming tasks such as updating the Network Loading Table.

Of course, there was much more to my work than just spreadsheets, one of my tasks was to provide detailed drawings of several new feeder lines for a proposed upgrade to Melbourne's electric train network. I was also fortunate to go on a number of field visits to witness the daily challenges that the electrical engineers at SP Ausnet face on a regular basis, such as the difficult task of trying to find a route for a 66kV line through the highly constricted and tight spaces found in terminal stations, or the project management challenges involved in trying to complete a project on schedule and to the projected budget put forward by the planning team.

It was these experiences that that provided me with a unique perspective of the electricity network that that I hadn't considered before my time at SP Ausnet, namely that the theoretical calculations and diagrams learned at university can only take you so far down the path of becoming an electrical engineer. I learned that the physical elements that make up the transmission network play just as important role in designing the network as the electrical characteristics that govern them, and that all these parameters need to be considered when developing a practical yet cost effective design.

Overall the time that I spent at SP Ausnet provided me with an interesting and worthwhile work experience that has changed my perspective on what it means to become an electrical engineer and further solidified my commitment to my studies.



**SP AusNet**

*A member of the Singapore Power Group*

**STUDENT:**            **Andrew Holt (RMIT)**

**COMPANY:**        **SPAUSNET**

During the summer of 2010-11, I was given the opportunity, courtesy the Australian Power Institute (API), for a three month vocational training program at SP AusNet, based in Southbank, Melbourne. My time here was spent in the Stations Development Section falling under Project Engineering.

SP AusNet is Victoria's largest energy transmission and distribution company. SP AusNet manages a \$6.3 billion electricity and gas network that services more than one million customers across the Victorian state. This being my second placement, as part of the API bursary program, has given me a much broader insight into the Electrical Engineering field. At first, I just learnt about transmission and distribution; but SP AusNet has helped me learn more about Project Management, Design and Town Planning Applications.

The two main projects during my time here was: Annual Planning Estimates and a Terminal Station Upgrade. With the planning estimates, my job with the lead engineer was to work on high level designs for various switch yards for Terminal and Zone Sub Stations. In doing so I had to learn everything there was to know about Terminal and Zone Sub Stations, for eg. the different components in a switch yard such as Circuit Breakers, Current/Voltage transformers, Isolators, Surge arresters etc. I had to learn how the feeders are connected to the bus line either by single switching or double switching or a breaker and half scheme. These were some from a long list of components that needed to be used in design. This has vastly improved my knowledge in Power Engineering, and has shown me how complex and intriguing engineering can be.

The Terminal Station Upgrade has opened a new door for me. It has shown me a different side to engineering, in terms of Project Management and in Property Management. This necessitated several meetings and site visits between the project manager, myself and the various contractors and consultants, to discuss the Town Planning Application (TPA). This was very important as without a TPA approval no work could be proceeded with. Consequently this also meant that several technical studies needed to take place. These studies necessitated site visits by technical specialists who would investigate and assess the potential impacts of the development in relation to urban and landscape design, noise, traffic, flora and fauna, cultural heritage and waste management. Outcomes from these studies would form a part of the TPA. Therefore my role was to assist the Property Lead (PL) and the consultants in collating all the required information and keeping track of costs.

I would like to take this opportunity to thank SP AusNet, and especially my Manager, the Property Lead, the Team Lead Primary, and Consultant who looked after my interests and helped me focus towards my career path. My sincere appreciation and thanks also to the Australian Power Institute and Partners for the bursary and for extending to me the much needed Vacation Placement Program.



**SP AusNet**

*A member of the Singapore Power Group*

**STUDENT:** **Glen Kuhne (Melbourne)**

**COMPANY:** **SPAUSNET**

During my three month placement at SP AusNet's main office on Southbank, I gained valuable insight into the workings of Victoria's power industry, specifically, transmission and distribution.

The team I worked with at SP AusNet was Smart Networks, Asset Innovation and Research.

The main projects I worked on at SP AusNet were:

- Researching corrosion detection systems for overhead conductor lines
- Available commercial satellite and aerial imagery providers
- Available mobile (ground-based) LiDAR scanning systems
- Modelling of vibration responses.

The impression I gained of power engineering from my time in Innovation and Research, is that while the power industry is a very old one (relative to other electrical fields), there is still much development and innovation, and my work here has improved my research, problem solving and critical thinking skills (as well as improving my knowledge of the power industry).

The main challenges I encountered in my research, was the open-endedness of some of the projects, not knowing if a solution was 'correct', and if my research was on the correct path, which is where I exercised my problem solving and critical thinking skills. Critical thinking was also very important when doing research, as most of it came from academic journals, which are extremely technical and I had to learn to filter out what wasn't important.

**STUDENT:** Nicholas Finch (Melbourne)

**COMPANY:** Wilson Transformer



After the month of employment I had a Wilson Transformer's Services division, my understanding of transformers and their involvement in power engineering dramatically increased through both my experiences and the company's education. Most of the work was mechanical engineering based, improving various designs with computer software. The month proved to be very challenging and was a great learning experience for my future development.

The following report gives an in depth summary of what the Wilson Transformer Company can provide for a student looking to undertake vacation employment. The report is aimed toward showing both people in the industry the benefits a student can take from vacation work, and students who are looking for employment the great rewards they can take from such an experience. This will also provides evidence of the non-technical benefits students can take from a period of industry based learning, which simply aren't part of current university curriculum.

Many challenges face power engineers in the not too distant future, especially Australian power engineers where carbon taxes are fast approaching a nation heavily reliant upon coal power. Wilson Transformer is moving toward the future with an intention of staying at the pinnacle of transformer technology. Their constant pursuit of improvement keeps the company ahead of the competition to maintain market position and meet new standards required for transformers worldwide.

My main tasks while at Wilson were mainly design challenges, such as improving previous designs with computer software and implementing new designs. Over the course of the month these designs were frequently modified after meetings with various stakeholders to improve them and modify to suit the requests of individuals.

Various other technical and non-technical tasks I completed over the vacation period proved to be invaluable experience. Not only did technical tasks improve my university based engineering knowledge, but non-technical tasks also gave me a whole new insight into the job of an engineer.

I would like to sincerely thank the Australian Power Institute, Wilson Transformer and Partners for such an amazing personal experience over January – February 2011.



**STUDENT:** Matthew Motea (Melbourne)

**COMPANY:** AEMO

Over the course of my two month employment at the Australian Energy Market Operator (AEMO) (530 Collins Street, Melbourne), I have gained a greater insight into power engineering as it pertains to the operation of the National Energy Market (NEM). This report details my employment at AEMO including the skills I have developed, the knowledge I've gained and the opportunities afforded to me.

My main position, in Transmission Services, was mostly concerned with the performance of Victoria's transmission system. I also had a minor role towards the end of my employment in the Planning Department's network analysis division.

I worked on two major projects and had a few other additional tasks throughout my placement at AEMO. My largest project was a review of instrumentation ranges for a section of Victoria's 500kV transmission network. This involved learning swiftly about power system analysis, particularly load flows, and the usage of software packages to simulate a transmission network.

My greatest difficulties in completing this project were inexperience in power analysis, lack of experience in using PSS/E (Power System Simulator for Engineering). These issues were remedied quite simply through actually working through the project and speaking with supervisors.

My second project involved developing scripts to automate the implementation of planned projects to simulations, enabling Planning to quickly and easily run studies with planned future additions.

My skills in data entry and analysis, programming and report writing have been greatly improved over the course of my time at AEMO and I have gained a greater exposure to the role of electrical engineers in a business or corporate context. Also involved were several site visits to power plant stations across Victoria.

I give my sincerest thanks to AEMO and the Australian Power Institute for providing me with these opportunities over summer 2010/2011.

**STUDENT:** Rex Pong (Monash)

**COMPANY:** Wilson Transformer



Over the summer break of 2010-11, I was able to work in one of Australia's leading power and distribution transformer manufacturers, Wilson Transformer Company. This opportunity to be involved and learn so much about the Power Industry owes to the Australian Power Institute and their Power Engineering Bursary Program.

Working under the Engineering division of the company, I was assigned to review Wilson Transformer's current designs from a corrosion perspective and suggest control measures, design amendments and changes to material choices.

During the placement, I was asked to present my progressive findings to the Engineering Management Team. In the last week of my placement, I prepared and made a presentation of my final findings and suggestions to Wilson Transformer's senior management team.

As a result of this work placement organised by the API, I have been lucky enough to continue working with Wilson Transformer.

I would like to sincerely thank Wilson Transformer Company and the API, for this chance to learn and experience working in the Power Engineering field. The effort that has been put in by both Wilson Transformer Company and the Australian Power Institute has not gone unnoticed and I would like to extend my full appreciation to them.

**STUDENT:** Matthew Van Bergen (Monash)

**COMPANY:** Wilson Transformer



I was fortunate to have been employed at Wilson Transformer Company (WTC) for one month over summer 2011. My main aim was to gain as much experience and knowledge as possible during this period, and to give something back to the company. I can happily say that I achieved all that I intended.

The transformer manufacturing industry is a very competitive marketplace where companies must grow and adapt to ensure that their products are not only the best available, but are efficient and effective in their designs in order to suit their client's requirements. This is a challenge that WTC is meeting by upgrading their facilities and equipment to ensure that their products are continually of an extremely high standard. From my experience, I have noted the importance of customer focus to innovate and propose solutions to satisfy particular needs. This is also vital to build long term alliances and ensure customers get even more value from the company's technical knowledge and experience. It also allowed me to understand the different roles and the basic operation of the company.

Throughout my work employment, I was involved in several projects. One of these was the creation of a training video, which involved filming the training instructions for a new workshop machine. To produce the training video was a challenge as I had only one chance to film. Any lapse in filming over the two days of training could mean that important information may be overlooked. I also had to refilm one section to make it easier to follow. My final product was short, concise and informative. Another project involved creating a Thermographic Survey Report template. This enables reports to be generated that detail particular temperatures of the transformer components and the maximum temperature spots. I had to overcome the barriers with the program that I had never used before and adding the necessary information to enable me to complete the report. I learnt that there is a need to be open minded and a willingness to try new things and be challenged, in order to gain maximum benefit.

My experience at Wilson Transformer Company was a very positive and valuable learning curb. I was amazed by the level of professionalism and willingness to try and provide the API students with the best possible experience. Being involved in a range of projects with employees from different departments opened by eyes to different aspects of the work environment. WTC provided me with the ideal work placement and I could not have asked for anything more.

**STUDENT: Sharanya Sridhar (RMIT)**

**COMPANY: Wilson Transformer**



Over the 4 weeks of vacation work placement at Wilson Transformers / Dynamic Ratings, my technical understanding & views regarding various aspects of the Power Industry has immensely improved.

For most of the 4 weeks I was assigned to Dynamic Ratings. Dynamic Ratings is concerned with the sector of the power industry that includes automation & communication between electrical devices by implementing simple devices that help monitoring, controlling and communication between electrical power transformers.

During my time at Dynamic Ratings, I was put on a few different projects to work on, namely- hardware assembly, testing and implementing an easier test procedure. Creating AutoCAD based Circuit diagrams and working with schematics, troubleshooting problems occurring in the devices at power stations & compiling a basic report on transformers.

In the 4 weeks at Dynamic Ratings I also had the opportunity to witness the challenges faced by this part of the power industry and learnt how it can be dealt with. Hence I consider this will be very valuable for my career in the power industry.

My research, presentation, report writing, organization, planning skills have improved immensely & I feel more confident to undertake further employment in the power industry, and I also feel better equipped to take on further challenges faced by the power industry.

This report contains in detail, the experience and knowledge I have gained during the 4 weeks of vacation employment at Wilson Transformers/Dynamic Ratings.

I would like to sincerely thank the Australian Power Institute & its partners for providing young engineers like me, the opportunity to gain experience in the power industry. I also thank Wilson Transformers & Dynamic Ratings for providing me vacation employment & thereby increasing my knowledge in this area of power engineering.