# Executive Summaries

## 2012-2013 Bursary Vacation Placements in ‘SA’

## List of Executive Summaries

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In the summer of 2012/2013 I undertook work experience at SA Power Networks, in the Smart Grid Delivery Team. The Smart Grid Team carries out a portfolio of trials of new technologies and innovations in the South Australian distribution network.

During my work experience, I assisted with two major projects: a trial of a residential capacity tariff in North Adelaide and the deployment of transformer monitors to selected distribution transformers around SA.

My main task on the capacity tariff trial was to extract data on participants’ demand patterns from the smart metering system and to present this data in graphs for customers and other team members. My main tasks on the transformer monitoring trial were to update the transformer monitoring system and database, investigate anomalous results, and visit sites.

Through these tasks, my knowledge of the SA distribution system has increased, particularly in the phenomena evident at the distribution transformer and household levels. I have also gained skills in managing, analysing, interpreting and presenting data in a variety of contexts. I have been able to observe aspects of the SA distribution system through site visits, and have gained experience in working on projects.

Through this work experience I have become better prepared for future study in engineering and physics, and for future employment in the electricity industry.

I would like to extend my gratitude to the Australian Power Institute and to SA Power Networks for the opportunity to undertake this work experience.
During the summer vacation, I had the opportunity to undertake a three months’ internship with Siemens Limited, thanks to the API Bursary Program. My placement was primarily based at the Siemens Turbomachinery Services (STS) workshop which provides a world-class service facility for rotating plant and equipment from the Power Generation, Oil & Gas and Mining industries.

Working under the supervision of the Workshop Manager and the Lean & Support Engineer, I was able to participate in numerous projects and assume different roles and responsibilities. The purpose of this report is to provide the API and interested stakeholders an insight into these projects, the experiences I have acquired and the outcomes of the placement.

The major project I was working on for the duration of my internship was the Engineering Design of a blade riveting machine. The riveting machine is to be utilized in the re-blading of turbines to peen the blade tenons to fitted shrouds. This project not only gave me the opportunity to learn about the design of turbine blades, in particular the design of the roots, tenons and shrouds, but I was also able to develop my project management skills as I was responsible for managing this project from the design stage through to the testing phase.

The project also enabled me to learn about the quality and safety procedures in place in industry as I had to conduct a Plant Risk Assessment (PRA), a Job Safety & Environment Analysis (JSEA) and write several technical documents, including a Pre-Operation Check and a Safety Operating Procedure (SOP), to ensure that the riveting machine is utilized correctly and safely. The other projects I had the opportunity to work on included an Engineering Study on an Insulation & Ventilation system for the workshop as well as two other projects which are part of the Lean Management program currently being implemented in the workshop.

These projects have helped me to develop an understanding of the day-to-day running of a workshop and the overhauls and preventive maintenance performed on rotating equipment. I have also been able to learn about the concept of Lean Management and the challenges of implementing such a system. Overall, my internship at the STS workshop has been very rewarding not only in terms of the exposure to the Power Industry, but also this experience served to reinforce my interest in undertaking a career as Power Engineer.
During the 2012/13 summer, I was fortunate to gain a place in the ElectraNet vacation program, commencing early December and finishing in late February. This report details my activities during the time, and will provide an insight into what current engineering students might experience while working in the power industry.

ElectraNet is the principal electricity Transmission Network Service Provider (TNSP) in South Australia. ElectraNet’s transmission network extends across some 200,000 square kilometers, consisting of lines operating at 132,000 and 275,000 Volts, and has almost 90 substations.

Managing South Australia’s electricity transmission network comes with inherent challenges, ranging from updating aging infrastructure, to ensuring a high degree of reliability, and dealing with the vary demands of the state’s significant wind resources. The transmission industry alone has many specialised areas, and working for ElectraNet has given me an appreciation of the diversity a career in power engineering can provide.

A significant portion of my time was spent working with reliability of substations. Early on I encountered the problem of defining what reliability meant, and how best to quantify it. To do this, I liaised with people from both sides of the equation; the people who gather and analyse the data, and the people who use it to make decisions. After writing the appropriate software, I experienced further problems when the software was not as intuitive as I had thought. This highlighted the importance of another key engineering area, documentation. Through writing a clear and thorough document, I was able to provide instructions to any user who wished to both use and modify the program.

I also spent time in the Automation and Protection group, where I worked with drawing software and databases used for information critical to the ongoing reliability of the network.
This report is the result of undertaking summer vacation work for ElectraNet from the 2nd December 2012 to 22nd February 2013. Over this duration work was performed in Telecommunications and Network Planning Sector.

This report serves to detail the work that was performed, challenges encountered and solutions discussed. The experience that was gained was important in understanding contemporary power engineering principles and problems.

It was shown that the high voltage Electricity Transmission Network could be subject to faults in future years, as a consequence these problems were studied using various methodologies and solutions proposed. Through this process a greater insight into the Electricity Transmission Network was obtained, specifically the lessons learned varied from understanding rules and regulations, study methodology of potential solutions and final decisions based on technical performance and economic modeling.

The final recommendation of the project was proposed network augmentation with the addition of reactive power support devices.