

Executive Summaries

2010-2011 Bursary Vacation Placements in South Australia

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STUDENT: Christopher Nugent (UoA)

COMPANY: Electranet

Over the course of the 2010/2011 summer, from the 29th of November 2010 until the 25th of February 2011, I undertook a vacation work experience placement in the Project Delivery team within the Network Services group at Electranet. Electranet is the major electricity Transmission Network Service Provider (TNSP) in South Australia. As such, Electranet's main role is to monitor, control and maintain the high-voltage transmission lines and substations that connect South Australia's electricity generation system to several customer connection points, in particular to ETSA Utilities' lower-voltage distribution network.

The purpose of this report is to explain my role in Electranet and to describe some specific examples of work which I have undertaken during this vacation student work placement, in order to highlight the main ways in which this work experience has improved my technical understanding of challenges faced within the power engineering industry, and indeed my understanding of the nature of work within the industry in general.

Overall my experience has been a positive one. I have gained a much more thorough technical understanding of the nature and components of a transmission network and I have met with a wide array of people throughout the organisation to learn of their respective roles. My understanding of project management has increased vastly and I now have an understanding of the complexity of executing a large power engineering project, and some of the challenges that can arise.

Some of my primary activities during the vacation student work experience placement included several site visits to major substation construction projects, through which I learned much about construction site safety, the order of installation works for major plant, the need for dynamic and sometimes rapid response to specific unforeseen challenges that can arise, and an insight into some of technical know-how held by experienced contractors I met on site. Another activity was to research and prepare two technical reports, one on the Principles of Earthing System Design, and the other on Substation Auxiliary Power Supplies. Through preparing these reports, my research and technical writing skills have been immensely improved, and for this reason I feel that I now have more confidence to undertake further study and employment in the power engineering industry. I feel I have also gained a far greater appreciation of the theory and actual design practice applied in the areas covered by the reports.

STUDENT: Azul Fernandez-Indulsky (UoA)

COMPANY: Electranet

The purpose of this report is to provide the Australian Power Institute with a written piece to highlight the knowledge and experience gained during the summer placement at ElectraNet Pty. Ltd over the university summer vacation November 2010 to February 2011.

My position as a vacation student in the Engineering Services-Lines Engineering team expanded my technical understanding of a wide range of aspects of and relating to the power industry.

My main tasks over the course of my placement were to write an engineering investigation report on the lightning performance of a transmission line, drafting a line design manual and undertaking loading calculations on some of the transmission towers so their mechanical strength could be determined for the retrofitting of the overhead ground wire. The mechanical strength was indeed of high importance as that would determine if any additional bracing was required to support the weight and tools of line workers on the tower's cross arms.

In addition to the tasks outlined above, I was required to prepare a presentation for Electranet's internal technical forum which is presented periodically by a group of chosen staff members. The topics are chosen at the speaker's discretion and must be relevant to the power industry and to the company alike. The topic I chose was on the electric and magnetic interference from overhead transmission lines on metallic pipelines, fences and railway tracks. The level of the presentation I prepared was up to standard, and the audience commented on how pleased they were with the level of information I had provided them with.

Having completed yet another work experience placement at ElectraNet has not only fostered a stronger interest in the power industry, but allowed me to gain valuable technical knowledge from the transmission industry.

STUDENT: Anthony Pemberton (UoA)

COMPANY: SKM

For seven weeks over the 2010/2011 university summer vacation, I was offered work as a Vacation Student at Sinclair Knight Merz (SKM). SKM is a leading multi-national engineering and project delivery firm. I gladly accepted the offer and was placed in the HDEL team in the Power and Energy business unit.

This report has been written for the Australian Power Institute as a result of my current holding of one of their bursary awards. The report aims to give an indication of the work I completed while working with SKM, challenges faced and ways they were overcome, relevance to my degree and future career and my experiences and impressions of working in the power industry.

During my time working at SKM, I was given a variety of work to do, all of which posed different problems and challenges. I created a Maximum Demand calculating spreadsheet based on AS/NZS 3000:2007 Appendix C which calculates the maximum current demand of a non-domestic electrical installation based on diversity factors. I undertook online lighting training with OSRAM and learnt about light principles and different types of lighting for varying applications. I also learnt to use and did some CCTV layout work in AutoCAD. I researched technical papers, went on site visits and attended technical and sales presentations. I also researched and wrote reports on residential solar photovoltaic systems and real-time power usage monitors for SKM's Sustainability Committee. I encountered some problems when coding the Max. Demand spreadsheet including the implementation of some of the more complex diversity factor rules, as well as creating an automatic phase balance feature. While I completed most of the diversity factors, some were simply too difficult to implement in code and the auto-phase balance also proved to be too difficult to implement given the time constraints.

My time with SKM was an invaluable experience. Had I spent more time there I could have worked towards improving the functionality of my work that I undertook during my placement. However, this leaves the opportunity for another employee or future vacation student to continue the work I started. I learnt a great deal during my time with SKM and enjoyed working there very much. I can definitely see myself working as a power engineer in the future.



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STUDENT: Philippa Williams (UoA)

COMPANY: AGL

For 12 weeks from November 2010 to February 2011, I undertook an API work experience placement with AGL, at their Torrens Island Power Station. My placement occurred in the Asset Management branch, reporting to Asset Manager Ralph Villarosa.

During my time at AGL Torrens Island, I was able to experience a broad range of roles including project work, design review, maintenance, operations, condition monitoring, data extraction and procedure design.

This has helped me to further my understanding of the complex and stimulating challenges with which power engineers are faced with on a daily basis. A high level of cross-disciplinary communication and technical understanding is required to be able to work on any one section of a plant this complex, as there will inevitably be many components which directly depend on or are affected by any change made.

Another challenge of working in such a plant is its age; many components are reaching their design life and in-depth engineering analysis is required to decide the optimal solution for prolonging plant life – be that repair, rebuild or replace.

Perhaps the most interesting issue that faces this industry, however, is that of power availability. As Torrens Island Power Station operates as a peaking generator, a large amount of effort was put in to making sure that when the demand was high, full availability was achieved. This issue will only become more prevalent as renewables are increasingly integrated into the market, and it was very valuable to see how the philosophy of the station's operation was based around ensuring that the plant was ready to meet demand.

Through this experience I have gained valuable technical understanding and knowledge about the power industry in general, as well as specific understanding relating to gas fired power stations, much of which is applicable to a range of thermal power stations.

I have also built on valuable skills in professional writing and communication, organisation and long-term planning, negotiation and compromise and the use of a range of computer applications.

This experience has been invaluable in developing my appreciation of the power industry and the many facets of power engineering. I would like to thank the AGL and Australian Power Institute, along with the API Partners, the University of Adelaide and Glen Jobling Consulting, for this incredible opportunity.



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STUDENT: Thomas Bilsborow (UoA)

COMPANY: AGL

I was privileged to be able to perform 12 weeks of work experience over my summer break at Torrens Island Power Station, which is operated by AGL. This power station is the largest single end-user of natural gas in Australia.

The following report outlines the level of knowledge that I gained during my 12 weeks of work experience at AGL Torrens Island.

I was involved with most aspects of Power Engineering during my experience which incorporated turbine, generator, boiler, control and test engineering. I also had the opportunity to work in most facets of the Power Station including Asset Management, Operations, Electrical Maintenance, Instrumentation and Condition Monitoring.

I learnt a great deal during my experience throughout these different departments; from understanding the technical arrangement of thermography cameras in Condition Monitoring to performing critical component refurbishment in Maintenance. Being able to be involved in solving technical challenges in different environments and conditions was an interesting and unique experience to have.

I also took part in developing a station-wide Management of Change procedure and working on a major Remnant Life study. These projects greatly developed my communication and reporting skills.

Engineering challenges at a place like Torrens Island are frequent and this provides ample opportunity to learn. The engineering disciplines which are regularly used at the station extend to the electrical, mechanical, control and chemical domains.

One concept I found interesting at the Island was the diversity of knowledge an engineer needs to have to be able to work effectively and efficiently at the plant, which can be a challenge to an up-and-coming Power Engineer. Electrical engineers performing vibration testing and Mechanical engineers describing thermocouples are a common occurrence.

I was able to be involved with some high-level engineering challenges which increased my level of large scale critical thinking and problem solving, vital for any professional engineer. One such challenge included me having to find an appropriate approximation for a stability model. This particular problem signified the fact that hardware constraints are a big issue when approximation models are to be increased in complexity.

The experiences that I have gained at AGL will no doubt aid me with my future dealings with industry, in particular the Power Industry. These same experiences have made me not only a better, more knowledgeable, prospective engineer but a greater person in general. I would recommend this experience to any student interested in the Power Industry.

STUDENT: Karthikeya Kuppa (UoA)

COMPANY: ETSA

During the university holidays between November 2010 and March 2011 I undertook work experience at ETSA Utilities. ETSA Utilities is a principal distributor of electricity in South Australia. The purpose of this report is to provide the University of Adelaide, the Australian Power Institute (API) and their stakeholders an insight into my work experience gained over these twelve weeks.

During my time at ETSA Utilities, I worked in the Field Services (FS) department with various groups ranging from protection engineering to substation construction. I was involved in various projects and one of them being with the protection engineers. It was about creating I-t (current vs. time) characteristic templates for all the ETSA fuses, relays and reclosers. This required me to gain background knowledge on all these devices and to familiarise myself with a software package called PowerFactory by DlgSILENT Pacific. Another project I was involved in was the upgrade of all the street lighting at Alberton. In both these projects, I had expert engineers who were guiding me along.

During these twelve weeks I was taken to many ETSA Utilities substations. Some of these being the Whitmore Square Substation and Keswick Substation in the city. I was not only shown the day to day life of a professional engineer in the power industry but also shown the day to day activities of the substation construction crew with whom I was involved in some hands on work like trenching underground cables, providing emergency cable bypass etc.

Being just in my second year of electrical engineering, it is very unusual to be exposed to power generation and distribution techniques. This gave a really good understanding about the purpose of substations and their equipment.

In conclusion, these twelve weeks of work experience at ETSA Utilities has been very useful and worthwhile. It has not only provided me with the technical knowledge needed from me in my third and fourth years but has also further motivated me to pursue opportunities within the power industry. I would recommend ETSA Utilities to other university students who want to undertake work experience within the power industry, as it is one of the best work experience providers for young undergraduates.