

Vacation Placement Reports 2016-2017

STATE	API BURSARY HOLDER	ORGANISATION	PAGE
NSW	William Hales	AEMO	2
NSW	Dary O'Shea	Aurecon	3
NSW	Shilpa Kala	Aurecon	4
NSW	Simon Ko	Aurecon	5
NSW	James Rudd	AusGrid	6
NSW	Timothy Williamson	AusGrid	7
NSW	James Jajjo	Endeavour	8
NSW	John-Mark Merhi	Endeavour	9
NSW	Justin Cruz	Endeavour	10
NSW	Mitchell Lew	Essential	11
NSW	Ahn Luong	TransGrid	12
NSW	Michael Manansala	TransGrid	13
QLD	Ryan Porter	Aurecon	14
QLD	Kaveri Pathak	Energex	15
QLD	Jevahn Gordon	Energex	16
QLD	Harshdeep Chawla	Energex	17
QLD	Kyle Raabe	Energex	18

STATE	API BURSARY HOLDER	ORGANISATION	PAGE
QLD	Luke McCarthy	Ergon	19
QLD	Brian Joseph	Ergon	20
QLD	Sam Machen	Powerlink	21
QLD	Steven Bickley	Powerlink	22
QLD	Lachlan Kuhr	Powerlink	23
QLD	Sam Harvey	AEMO	24
VIC	Jack Bryant	Aurecon	25
VIC	Gabrielle Theron	United Energy	26
VIC	Cameron Finlayson	United Energy	27
VIC	Shane Holcombe	Wilson Transformer Company	28
VIC	Ross MacAndrews	Wilson Transformer Company	29
WA	Leon Chong	Western Power	30
WA	Ananya Chaturvedi	Western Power	31
SA	Adam Dyson	Western Power	32
SA	Jerome DeVera	SA Power Networks	33
TAS	Kurt Mackey	TasNetworks	34

William Hales - AEMO

Executive Summary:

For a nine week period I worked for AEMO in a placement arranged by the Australian Power Institute Bursary program. Within AEMO I worked in the Network Development (ND) team, which primarily handled organisations applying to connect large (greater than 5MW) generators and loads to electrical networks such as the NEM.

In my work I learned a variety of new technical skills and industry practices that I had not previously been exposed to. My work ranged from simulating faults in applicant-provided models and assessing their results, to re-designing databases and rewriting code that automated and assisted team work and management.





Darcy O'Shea - Aurecon

Executive Summary:

My workflow at Aurecon closely matched that of my manager. Initially, the Energy unit as a whole focussed on finalising projects that were due before Christmas. The projects I worked on during this time were very interesting, as they varied greatly in terms of what the engineers in charge of the project were actually required to do. This period of my work experience was filled with learning general skills associated with engineering work.

After the Christmas break, my work focussed on a new project. My task was to analyse an existing design for a power station and verify whether a proposed update would be handled by the current system, or whether modifications would need to be made. This involved learning how to use high-end modelling software to simulate the current system and then run tests with the correct parameters to simulate the response of the system to the proposed updates. This work also involved finding and verifying the accuracy of the data given to us by the client.

After the simulations were finished, judgements had to be made about whether the results confirmed problems with the station design, whether they needed to be fixed, and how if need be. This was not up to me to decide, as I did not have the required knowledge, and this only comes through experience with this specific client. In the end, it was determined that only certain parts of the station could be modified and thus our next stage, of telling the client what we had deduced, began.

From here on, I was more of an observer who could comment where needed on details to do with the actual analysis and result-gathering, rather than the on putting the most hours into the project, as I was before.



Shilpa Kala- Aurecon

Executive Summary:

From 23rd November 2015 to 19th February 2016, I was given the opportunity to work as an Industrial Student at TransGrid for a vacation placement. As a third year Engineering student, I was placed in an intern role in the Asset Management, Power Systems Analysis group of the company.

In this placement I was involved in several first hand engineering related tasks, programming and documentation. I was introduced to load forecasting methods and developed MATLAB programs for weather and day type correction modelling. As my work in MATLAB investigated a new method for statistical calculations, I documented my findings and approaches to solving the problem. I was able to learn new concepts at TransGrid to apply and develop my skills. I also used PowerFactory to conduct load flow studies for a new wind farm and assisted with investigations for possible improvements to the network model.

Additionally, I was able to develop an understanding of the operation of a power company by constructing several workflow process diagrams for the Power Systems Analysis group. I was given opportunities to improve my communication skills through discussions with colleagues and by giving a presentation introducing MATLAB.

Over these 13 weeks I gained many valuable insights about the roles of engineers in the power industry, especially in the context of planning. I have understood more about the work of engineers in a company setting and the importance of communication and collaboration between teams.



Simon Ko - Aurecon

Executive Summary:

This report presents an overview of the main projects undertaken during my summer vacation placement at Aurecon between December 2016 and February 2016. My position was in the Energy Unit based in Neutral Bay as an Undergraduate Electrical Engineer. Projects I participated in included railway projects, power generation, transmission and distribution. As most of the projects are large projects and completely new to me, my role was to help the other engineers in less critical parts of the project which allowed me to familiarise myself with the terminology, technology and techniques. It also allowed me to experience working on real-world projects with engineers in a group from different fields and even in other countries.

My previous placement at Endeavour Energy through the API certainly helped me with the power projects. This placement at Aurecon also showed me how different engineering design is to operating the equipment. Engineering design is a critical stage of any engineering solution as the decisions made during this stage may affect the construction, installation, operation, maintenance and safety of the solution. The projects in which I was part of also showed me how important it was that the client is able to understand the significance or consequences of the solutions engineers produce.

Throughout the placement I was fortunate to be able to work with highly skilled and experienced people in the industry who were all very kind and willing to explain how things worked. All the engineers were patient and took the effort to ensure that I understood what they were explaining and they did this in between their extremely busy schedules.

The opportunity to work in the industry to complement my studies at university and support future employment is extremely valuable. The efforts of the API, Aurecon and all the people in Aurecon throughout this summer to accommodate undergraduate engineers like myself is greatly appreciated and the experience has been phenomenal.



James Rudd - AusGrid

Executive Summary:

Through the assistance of the Australian Power Institute program, I was given the opportunity to spend the university summer break working together with the Hunter Substation Design group within the Ausgrid organisation at the Wallsend admin offices. This report aims to primarily highlight the role I took on within Ausgrid and the key tasks and learning opportunities I was challenged with. This placement period offered the ideal opportunity to take on real-world problems that are currently being faced by the engineers as well as provide invaluable insight into the various roles undertaken within the distribution network.

Over the 12-week placement period, I contributed towards a number of tasks that provided a well-structured insight into the many responsibilities the engineers and engineering officers within Ausgrid undertake. During my time here I was given the opportunity to not only be involved in substation design work, but also take a look into some of the many tasks taking place in other groups including Earthing, Protection & Control, Mains Design, SCADA Systems, Surveying and System Control. Amongst the countless small tasks that passed my way, my key workings during placement included an overview analysis of the lighting utilised within substations, injection testing at the new Munmorah STS substation and varying design work for Muswellbrook Sub-transmission (STS), Denman Zone (Zn) and Waratah Zn substations.

Despite this report only covering the key projects undertaken, amongst these tasks also involved:

- Multiple site visits to a vast number of substations.
- HV, partial discharge and dielectric loss angle testing at Pelican Zn.
- Multiple earthing testing trips at various substations to test earth potential rise and touch-step potential differences.
- Invasive Nail-pole investigation/field work and reporting.
- Control room shift visit during 40°C day and afternoon storm, i.e. multiple outages
- and challenges throughout the day.
- Substation survey of asset arrangements within yard.
- Transmission line design and simulation.
- Protection fault investigation including reports and fault level simulations.
- System control data processing and load control including load flow simulations.

Being a part of the Ausgrid organisation allowed me to challenge myself and become exposed to as much knowledge about the distribution side of the electricity network as possible. The practical experience gained while on placement may go a long way to influence my decisions coming into the new university year with the hope to complete the degree by the end of the year.



Timothy Williamson - AusGrid

Executive Summary:

This report details my Australian Power Institute Vacation Placement at Ausgrid over the summer of 2016/2017. This placement took the form of two rotations, one at the Substation Design group and one with the Major Projects group. In both rotations I was primarily tasked with assisting the engineers in their roles.

In Substation Design I worked on diagnosing a failure on a switchboard that supplied the ancillary services to the substation, as well as investigated information regarding Ausgrid's internal standards of 11kV terminations.

In Major Projects I worked on tasks relating to the commissioning of the new Olympic Park Zone Substation. In particular acquiring replacement Voltage Transformers for its associated feeders. In addition I worked on procuring Current Transformers and fibre optic Arc-Flash Detection sensors.



James Jajjo – Endeavour Energy

Executive Summary:

To be uploaded.



John Mark-Merhi – Endeavour Energy

Executive Summary:

My 3 month industrial experience placement with Endeavour Energy is summarised thoroughly within this report. As a third year transitioning to fourth, this experience has greatly impacted my studies and overall knowledge in power systems engineering and also reiterates the primary purpose of power engineering within this contemporary context. The initial days of this experience provided me with an informative insight of my position, role and purpose within the company. I worked with the Operational Performance Team within the Network Services Division, under the management of Robert Armstrong.

This report will examine the key aspects of this vacation including the project I was working on, the regular meetings and team briefs I attended in order to validate my work and performance within the team, the Endeavour Energy site visits, the learning experience and the minor issues I encountered and the strategies adopted to fix them. I worked on a project labelled 'Weather impact on network reliability, prediction and operational response', which consisted of me measuring climatic data supplied by the Bureau of Meteorology Australia against emergency dates that included faults in Endeavour Energy assets. Through a range of analytical methods I was able deduce outcomes that successfully provided insight on the level of effectiveness certain climatic catastrophic are on faults within the network, and thus lead the team and I to plan procedures for emergency staff at certain depots within the Endeavour Energy network in an act of precaution towards any disastrous forecasted weather event.

The main issues I encountered during this experience would be my lacking ability in analytical and statistical methods of collating and manipulating data. This was primarily due to my diminished Excel statistical skills. My previous experience had uplifted my technical skills with regards to PowerFactory, calculating load flows, conducting short – circuit analysis on subsystem grids and designing/redesigning subsystem plans. Through the progression of this experience and the assistance of Mr Robert Armstrong and his colleagues my statistical excel skills successfully improved, thus enabling me to produce excellent outcomes.



Justin Cruz – Endeavour Energy

Executive Summary:

This report provides an analysis and evaluation of the vacation work undertaken by Justin Cruz in Endeavour Energy, Huntingwood from November 28 2016 to February 24 2017. The vacation placement exposed the student to the different types of work performed in the Project and Program's branch. Through this, the student was able to develop his understanding of Endeavour Energy's role as a power distribution company. In doing so, the student was able to improve both project management and engineering skills and, improve his communication skills at a corporate level.

The placement was a challenging learning experience for the student. Due to the short duration of the placement, it became difficult to simultaneously adapt to the workplace environment and also learn new concepts. It was through reading previous reports on projects that the student was able to attain the knowledge he required to accomplish the work through his placement. Moreover, it is evident in the report that a longer duration for the placement would be recommended for the future to not only further develop knowledgebase and skill but also communication skills.

The vacation placement in Endeavour Energy was both a rewarding and a valuable experience for the student. The student was provided many opportunities to practically apply his skills and knowledge through his involvement in various forms of work and projects. Not only did this solidify his knowledge but also provided an industry perspective to his newly learned skills. In doing so, the student was able to explore both new ideas and technology that benefited his studies at university.



Mitchell Lew – Essential Energy

Executive Summary:

The purpose of this report is to provide an account of the experience that was had during work placement at Essential Energy and detail the learning that took place. This report will show how I was able to start from a place of eagerness but little key knowledge or experience and be able to challenge myself to firstly, be a productive and valued member of the team, and also to learn about the company and the industry and explore possible future paths that I may take.

I was placed in the Design and Constructions Standards division working with the Underground team. I was able to take on small projects and tasks associated with Underground to Overhead (UGOH) terminations, conductor helical fittings, composite crossarms, underground splicing and terminating and reclosers. I was able to learn about the large distribution network from a perspective of the problems and things that go wrong. I learnt about what problems occur and how exactly they become problems. I learnt about where they most often occur and the causes for the problems. I was able to get first-hand experience in gathering information about faults and analysing the information to determine a course of action in response, in the short term, in the long term and also the development of contingencies and preventative policy.

The things that I learnt the most from were opportunities to get up close with or interact with the different assets or systems. I was taken on tours of multiple overhead substations, the nearby depots, the control room and into multiple different sections of the business, such as protection and design. I spent a lot of time in the Quality Lab (QA Lab) being able to pull apart and test various pieces of overhead and underground equipment. This allowed me to connect theoretical information about electrical engineering and the broader network design and industry with the actual devices and processes that are used to solve problems.



Ahn Luong - TransGrid

Executive Summary:

During my 2016/2017 summer break, I undertook industrial work placement with TransGrid under the Australian Power Institute bursary program. The purpose of this report is to provide detailed information regarding my experiences in working in an engineering environment as an undergraduate engineering student. I worked within the Network Planning and Operations Business Unit, positioned in the Control Design group, which is part of the Communications and Automation Design team.

Throughout my time at TransGrid, I was involved in several projects and development opportunities. These include:

- Development of Standard Drawings
- Relay Testing Instructions
- Modification of Standard Design Manual
- Development of Cable Schedule
- Drafting of Design Advice and Automation Connection Agreement
- Drafting of Substation Protection Tripping Scheme
- Relay Replacement Recommendation
- Factory Acceptance Testing
- Verification of Rating Advice
- Verification of Work-As-Executed Drawings

Apart from working on projects, I had the opportunity of visiting TransGrid 330kV SF6 insulated substation, automation testing laboratory, as well as IEC 61850 digital substation. I was able to observe the functionality of, and interface between various equipment, monitoring devices, control and protection panels. This particular experience was very valuable, as it further strengthened my knowledge of control and automation related systems. This placement has given me a greater insight into the field of power engineering, as I have gained a better understanding of the design, execution and maintenance process of TransGrid's assets. Additionally, the placement has improved my time management, analytical, problem solving, written and verbal communication skills.

I would like to extend my sincere gratitude to TransGrid and the Australian Power Institute for the valuable opportunity and experience within the power industry.



Michael Manansala - TransGrid

Executive Summary:

This report outlines my 12 week placement at TransGrid from 21st November 2016 to 24th February 2017. I worked in the Network Modelling and Performance Team under the Network Planning Group and was based in the Sydney Office at Thomas Street in the Sydney CBD.

Throughout my placement I largely worked on updating models of the high voltage transmission network using DigSILENT PowerFactory, as well as using these models to perform studies to assess network capability. Some of the major projects I worked on was a potential new interconnector between New South Wales and South Australia and updating TransGrid's PowerFactory models to be able to perform harmonic analysis. In addition to gaining proficiency in the use of PowerFactory, I gained a general understanding of how the transmission network in NSW works. This includes the general network topology, what kind of equipment is used and what kind of studies need to be done such as load flow, fault level and harmonic analysis.

Being only in second year, I had only encountered a few power systems concepts in my subjects but fortunately I was able to pick up the work and perform several studies. In addition to the technical skills I picked up such as proficiency in programs including PowerFactory and Microsoft Excel, I also developed soft skills in the areas of written and verbal communication in order to describe the methodology and results of the many studies I performed.

I am grateful to TransGrid for allowing me to complete a placement with them and for the skills I have learnt at my time with them. I look forward to going back to university to enhance my theoretical knowledge, given the practical application of engineering which I have just seen.



Ryan Porter - Aurecon

Executive Summary:

This report details the work I was involved in during my vacation employment at Aurecon. During that time, I had the opportunity to work on a variety of different projects which exposed me to many new areas of power engineering and allowed me to gather a greater understanding of some of the tasks power engineers do on a day-to-day basis. By undertaking multiple projects, mainly focusing on protection systems, I was able to learn many new concepts as well as experience industry standard programs and tools used to model the power network.

The department within Aurecon which I was involved in was Energy & Resources. Broadly speaking, this is the group responsible for all electrically based projects, including power stations, design of electrical substations, power system studies (such as connection of renewables) and protection. Within the Energy & Resources division, I was mainly involved in protection systems, but had exposure to other areas throughout my placement.

The specific projects I was involved in were mainly protection based jobs, with the exception of calculating the distribution loss factor (DLF). The protection jobs required me to complete lots of smaller tasks, such as interpreting network and protection diagrams and conducting fault studies on different parts of the network. Once these smaller jobs were complete I would then need to grade the protection relays, which meant ensuring that the nearest upstream circuit breaker to the fault trips before any other, whilst still having backup protection provided by other upstream relays. The DLF project required load flow simulations of the network to individually connected customers (ICCs) and to then calculate the losses associated with providing power to those customers.

Overall my experience at Aurecon was extremely valuable. Thanks to the fantastic support and teaching I received, I was able to learn about many new areas of power engineering, as well as take part in some interesting projects. Not only did I learn about protection systems in the power engineering industry, but also had exposure to many industry standard software packages that will be helpful experience in future years. This placement has been very valuable for both my studies and for future work experience.



Kaveri Pathak - Energex

Executive Summary:

This report details my work as a student engineer at ENERGEX over a six week period during the summer of 2017 and has been broken into two sections as I was assigned to work within the Mains Design department and also worked with the Power Systems Engineering team for two weeks. The sections detail my work with each department.

Working in two different departments helped me gain an appreciation for the different facets of the business, I was exposed to the more technical standards and details of the projects and also to the service delivery related aspects which deal more directly with the customers.

One of the main assignments of my employment was to collate and extrapolate some data from ENERGEX's transformer monitoring systems for some of the larger commercial and residential projects completed within the CBD. The aim of this project was to analyse the installed capacity and determine whether or not the measures that are used to assess customer loads need to be revised.

Under the supervision of a project engineer within the circuitry team of the Power Systems Engineering department, I was able to study an entire project that he was undertaking. This project also led to some research and learning about switchgear and protection used within substations. A major component of this placement was site visits to the different types of substations that ENERGEX has and this led to a deeper understanding of the practicalities and constraints of the business.

Although the period of my employment was quite short, I was given various opportunities to explore many different departments of ENERGEX and meet with multiple people and discuss their roles and career trajectories at ENERGEX as well as the power industry as a whole.

I would like to express my gratitude towards the API and Energex for providing this wonderful learning experience that has allowed me to understand the power industry and how I can fit into it and develop my career through it.



Jevahn Gordon- Energex

Executive Summary:

As a vacation student in the “Field Test” group, which forms part of the “Field Services” department of Energex, it was fascinating to learn about the infrastructure and secondary systems that support the electricity network. Energex provided a valuable learning experience with a variety of relevant tasks, and an excellent supervisor.

This report discusses some of the learnings during this time, including a better understanding of protection concepts as well as practical experiences. The tasks of automating and documenting test plans for relay testing provided the opportunity to learn more about fundamental protection concepts, such as POTT schemes (permissive over-reach transfer trip), CBF (circuit breaker fail), ARC (auto-reclose) and ARS (auto-restore), and SOTF (switch-onto-fault). Protection documents and user manuals proved to be very helpful in this regard, as well as explanations from my supervisor and other professionals.

A lot of practical experiences were gained through demonstrations of relay testing, such as the testing of FD (feeder differential) and UV (under-voltage) relays. There were also multiple instances of investigative testing, where standard testing had indicated a potential issue, and the situation needed to be investigated further. Simple test equipment such as a “tong” or a “doble” demonstrated how theoretical concepts (such as magnetic flux) could be so useful in real situations.

Site tours and varied work locations formed a vital part of the learning experience. For instance, it was fascinating to go on-site to view an underground cable fault and consider the potential impacts to the community, environment, and budget.

Research was also undertaken in many areas including capacitor banks, open-delta configurations, bus zones, and self-healing networks, and a lot was learnt from other research presentations from graduates at Energex. Meetings and discussions on an array of topics were also very interesting, ranging from a meeting with contractors and councillors about a new solar farm and substation, to modifications to Energex’s ARC (auto-reclose) and ARS (auto-restore) policies.

Clearly, Energex provided a valuable engineering work experience that has ultimately strengthened my resolve to become a power engineer in the future.



Harshdeep Chawla - Energex

Executive Summary:

During the summer of 2016/17, I completed 12 weeks of work experience at Energex as a Student Engineer. I worked in the Network Operations group within Energex's Service Delivery Division.

With their number one priority being to help 'keep the lights on' within South-East Queensland, the Network Operations group is responsible for many tasks, including but not limited to controlling the network, managing network loads & voltages and allowing for safe and organised planned or emergency network access. My experience at Energex involved various challenging learning experiences and activities that allowed me to gain a broader and deeper understanding of many concepts related to power engineering, and the power industry itself.

Some of the learning opportunities and tasks given to me included preparing contingency plans, determining voltage regulator line drop compensation (LDC) settings, performing protection grading studies and completing voltage studies for planned jobs on the 11 kV distribution network. These tasks allowed me to venture beyond my university studies and familiarise myself with new concepts and software, such as DINIS and SINICAL. Furthermore, I was given the opportunity to learn from highly knowledgeable engineers within the organisation who were always able to answer my various questions and give me valuable advice on everything that I was working on. In addition to this, gaining a practical appreciation for technical concepts is a key aspect of being an electrical engineer, and by attending a site visit to the Newstead 110/11 kV zone substation, I was able to do just that.

I would like to thank the Australian Power Institute and Energex for giving me the invaluable opportunity to enhance my understanding of the power industry, and leave with a greater appreciation of the power engineering profession.



Kyle Raabe - Energex

Executive Summary:

Over the 2016/2017 summer break, I completed a 12-week work placement at Energex as a Student Engineer in the Power Quality and Reliability Team. While at Energex, my main task was to continue the development of an automated program to aid in the balancing of Low Voltage (LV) networks. Network balancing is of key importance to the Power Quality and Reliability team as poorly balanced LV networks are subject to power quality issues, safety concerns, decreased efficiency and the risk of damage to customer and Energex equipment.

Currently field crews are dispatched to balance LV networks either under the proactive balancing program or reactively in response to voltage complaints from customers. To deal with issues in current balancing methods there had been support for the development application to automate the balancing data collection and decision making process.

The final scope of the program states that it should be able to:

- o Run on a tablet or PC with Excel
- o Download customer and site data from Energex NRT databases
- o Map out any given LV network (Non-radial networks and networks with data quality issues excepted)
- o Allow the user to input the results of a phase survey.
- o Estimate the nodal voltage profile of each phase and present the result graphically
- o Estimate neutral currents
- o Automatically calculate a balance for a network
- o Provide an interface for returning post-balancing data to the data team
- o Be simple to use by Energex engineers or field staff
- o Be cost effective to implement

Over the course of the work placement I successfully developed a tool that showed potential to be implemented in the field. The Low Voltage Balancing Tool covers the project scope providing features that will allow for increased efficiency in the balancing of LV networks. This Low Voltage Balancing Tool has been constructed in Excel allowing for future changes to be implemented if necessary.



Luke McCarthy - Ergon

Executive Summary:

From 21st November 2016 to 24th February 2017 I undertook engineering placement with the Substation Design Standards team of Ergon Energy's electricity distribution branch. The following report outlines the skills and insight into Queensland's power industry I gained throughout my placement period. Under the supervision of Ergon Energy's power transformer subject matter expert (SME), I was involved in a number of challenging and informative projects.

These included:

- The development and proposal of an online condition monitoring (CM) strategy.
- An update to the Substation Standard for Clearances in Air.
- The revision of implementation plans for FR3 transformer insulating oil.

In developing the CM proposal, I experienced multiple stakeholder agendas. I developed communication techniques to realise a commonly endorsed project goal. Through data analysis in Microsoft VBA and Excel, I developed a justifiable list of transformers suitable for CM. I was exposed to Ergon Energy's network priorities and developed a clear understanding of a power substation's constitution.

To update the Clearances in Air Substation Standard, I reviewed many Australian and International Standard practices. I also reviewed state regulations and equivalent documents from other electricity utilities. I gained a thorough understanding of industry best practice and the clearest means to describe information.

I presented my recommendations to the workgroup and completed a draft document for internal review.

Being involved in the pilot retro-fill of an FR3 transformer gave me experience with the introduction of new technology. I attended supplier/manufacture meetings and determined ways to standardise the project implementation. I also reviewed a toxicology report and evaluated the economic, social and environmental impact of the oil in question. The project was to go ahead in late 2017.

This placement opportunity gave me a broad understanding of engineering practice, furthering both my skills and interest in the power industry.



Brian Joseph - Ergon

Executive Summary:

The Australian Power Institute provided me the opportunity to complete a 3-month placement with Ergon Energy in the Network Strategy & Policy team based in the Brisbane office. Prior to this placement, I was fortunate enough to complete placements with Energex in Network Operations and Powerlink in Secondary Systems Designs with the support of the Australian Power Institute. This placement was my final industry placement before graduating at the end of 2017 and allowed me to bring together my previous industry experience together with some of my university power subjects and apply it to my work.

During my 3-month placement with Ergon Energy, I was primarily working within the modelling team and assisting with the transition from DINIS to DlgSILENT PowerFactory. A summary of the work completed is highlighted below:

- Auditing/Correcting electrical connections in the sub-transmission model
- Accessing GIS/Source Systems to evaluate models
- Development of scripts to align switch states with a determined operational state from historical SCADA data.
- Development of Python Library to access historical SCADA data.
- Assist with development of Python scripts for PowerFactory.
- Presentation of work at the Engineering Development Seminar

This placement has allowed me to develop not only my understanding of Ergon's distribution and sub-transmission network, but also develop skills in scripting such as Python and VBA as well working with big data and with different teams across the organization. I extend my gratitude to the Australian Power Institute for giving me the opportunity to gain experience across the Queensland Power Industry during my undergraduate studies with previous placements with Energex and Powerlink Queensland.

The bursary program has strengthened my understanding and interest in the Industry and my future endeavors.



Sam Machen - Powerlink

Executive Summary:

From 21 November 2016 to 24 February 2017 I was fortunate enough to be employed as a student engineer with Powerlink Queensland, which is a Government Owned Corporation responsible for the operation of the high-voltage electricity transmission network in Queensland. I was placed within the HV Asset Strategies team under the supervision of the Asset Strategies Manager, David Gibbs. This report is intended to provide the reader with a summary of my experience working at Powerlink Queensland. I had three main tasks during my employment at Powerlink which were

1. Health Index forecasting task
 - Analysed large data sets to predict how the condition of equipment progresses with time
 - Spanned the entire 14 weeks of employment
2. Circuit Rating Dashboard programming task
 - Used VB.NET code to develop a user form which displays forecast of circuit/feeder current ratings
3. Probability model development
 - Analysed data sets to develop common probability of failure curves such as the probability density function, cumulative distribution function and hazard function

I was taken on three field trips to visit substations where I was able to examine HV equipment up close. This was an excellent way to gain an understanding of some of the more practical considerations that are necessary in power asset engineering - beyond that of university level theory.

Overall, I have found this experience to be invaluable. I have gained a deeper understanding of the Queensland transmission network and an appreciation of the difficulty associated with managing high risk and high cost HV assets. In addition to this, I have gained technical skills in the use of the VB.NET programming language, asset management and data analysis. This experience has given excellent exposure to the business environment, allowing me to develop my professional skills as an engineer. I cannot thank the Australian Power Institute and Powerlink Queensland enough for giving me this opportunity.



Steven Bickley - Powerlink

Executive Summary:

This report is a summary of the industry experience I undertook as part of my vacation placement at Powerlink over the 2016/2017 summer. My position at Powerlink was within the Digital Asset Strategies team who have the task of management of the planning and delivery of Powerlink's digital asset management strategies.

My role was to provide support to my team in regards to restructuring the asset structures of the site communication and secondary system digital assets. This project enabled me to collaborate with many different teams and individuals within Powerlink which has helped me to form many valuable relationships within the electricity industry. The tasks also helped me gain a greater appreciation of the role Powerlink plays in the Queensland electricity industry.

This experience has provided me with an excellent platform from which I have been able to apply my academic studies to real world problems. It has sparked a greater interest and appreciation for the electricity industry as a whole and also introduced me to the many opportunities that come with the changing landscape of the electricity industry.

Overall, I am extremely appreciative to Powerlink (and the API) for the opportunity I have been provided with and for the experience, ideas and realisations that came with it. I have been fortunate enough to be exposed to a wide number of opportunities for innovation and entrepreneurship within the electricity industry, of which I aim to address and solve as I progress in my professional career. I have also formed many valuable professional relationships with individuals whom have been able to offer me advice, insight and knowledge that I will certainly take forward with me into the future. I have developed a better understanding and appreciation of the electricity industry which has helped me make more informed and passionate decisions in regards to the path I wish to take in my professional career.



Lachlan Kuhr - Powerlink

Executive Summary:

This report aims to provide a brief summary of my experiences as a Student Engineer at Powerlink Queensland. I was fortunate enough to partake in this valuable industry work experience after completing my first year of studying a Bachelor of Engineering (Honours) / Bachelor of Mathematics at the Queensland University of Technology. I commenced work at Powerlink Queensland in November 2016 within the Delivery and Technical Solutions division as a Vacation Student Engineer in the Secondary Systems Design team for a duration of 14 weeks over the university summer break. The role entailed working on several projects under the guidance of members of my team. Over the course of my placement, I was exposed to and gained an appreciation of the challenges facing the power industry into the future.

Secondary System Design (SSD) includes all protection, control, telecommunications, condition monitoring, power supply, panel, cable and building requirements necessary to control, monitor and protect the high voltage (HV) switchgear at a substation. Other work in the scope of SSD includes telecommunications, AC/DC distribution and reticulation, revenue metering, fire and security systems, etc.

The work I completed involved primarily office based secondary systems design duties including circuitry, control and configuration designs. The work required a high level of decision making reliability as evident in any design work. I worked on several key areas over my time as a student Engineer at Powerlink. One project I worked on was to upgrade Substation Security at 28 high security risk sites by the end of July 2017. Another area I worked on was configuration design for automation functions within the substation. Complimenting this, I also worked on the design verification process. Other design work I did was the design of isolation diagrams for a couple sites. I also completed post-commissioning of design schematics for substation upgrades and a variety of general design requirements.

My experiences and work during my time with Powerlink have given me insight into the Electricity Supply Industry and Power Engineering. I look forward to expanding my knowledge and experience in other areas of the Industry in the future.



Sam Harvey - AEMO

Executive Summary:

The Purpose of this report is to document and communicate the workplace experience of an Engineering Student at The Australia Energy Market Operator. The placement was made available by the Australia Power Institute Student Bursary program over the summer vacation. The student was employed by the Operations department under the guidance of the Executive Officer. The student's task was to develop a system that created visibility for Operations to oversee all projects and deliverables. The task involved data acquisition and research to create an up to date repository of information followed by a number of self-populating output functions.

The data could be filtered by the user by any criteria in order to produce the desired output. The key outputs included a Gantt Chart view for project durations, a To-Do list for user defined ranges, and an events calendar with selection criteria.

The placement allowed application of many inter-personal skills in the workplace that cannot be achieved through in an academic setting. Such an opportunity fosters students to fast track their professional development in a well-supported environment. Such a tenure can provide invaluable experience that culminates in a student who is in a strong position upon graduation.



Jack Bryant - Aurecon

Executive Summary:

The purpose of this report is to detail the engineering activities I carried out during my 13-week work placement at Aurecon over the 2016/2017 university vacation period. During this time, I worked within the Energy & Resources team of engineering consultancy Aurecon. I was assigned to work on the Caulfield to Dandenong: Level Crossing Removal Project within the Substations Design team under the supervision of James Massoud (Substations Design Manager).

Over the course of my placement, I completed a wide range of design tasks which included:

- Protection coordination and fault study for a traction power substation
- Earthing system design for a traction power substation
- 48V DC battery system calculations
- Cable ladder design and loading calculations
- Delivery of Preliminary and Detailed Design packages for a traction power substation
- 400V AC switchboard design
- Cable and I/O schedules for new and existing traction substations being upgraded
- Investigation of alternative battery designs

This report will also detail the methodologies and engineering tools I used within some of the design tasks I carried out, as well as the challenges I faced and how I overcame these problems to provide quality solutions.

Having the opportunity to work within a multi-disciplinary design team on a large and complex engineering project allowed me to gain further understanding of some of the key challenges engineers face daily, as well as how sound engineering processes can be applied to solve a range of engineering issues. This is a result of my exposure to numerous design phases over the course of my placement including the Preliminary Design, Detailed Design and Final Design of various traction power substation packages. I would like to thank Aurecon for their support of the bursary program and for providing me with such a fantastic opportunity. Also, a special thank you to James and the rest of the Substations Design team for the support I received during my time on the project.



Gabrielle Theron - Aurecon

Executive Summary:

The purpose of this report is to explain in detail the experiences and work done during my vacation placement at United Energy.

Twelve weeks were spent from the December 2016 to March 2017 at United Energy. Most of the time spent there was focused on reviewing and querying outsourced customer initiated design work and drawings for the Electricity Network design team. This was done to ensure a standard of quality for outsourced work was maintained and to determine any areas that required further investigation.

Once areas of possible concern and areas that required further information were identified, these points were relayed to the main distribution design engineer who assessed the points and queried the relevant people. Information gained from these queries will be able to help determine future processes for outsourced design work.

As a result of the time spent at United Energy, much about the distribution design process was learnt, and an understanding of the various components, systems and organisational structures that form an electricity distribution system was attained. Further, a comprehension of the common issues, considerations and regulations that effect the design and construction process of distribution systems was attained.



Cameron Finlayson - Aurecon

Executive Summary:

This purpose of this document is to outline the experiences that were achieved at my time working for United Energy within the network performance team. Upon reading this document an understanding of the projects that I worked on during the vacation placement should be established, including my role and responsibilities within the network performance team.

During my time at United Energy I worked on several project. During these projects I experienced many challenges including having to use software that was I was unfamiliar with, producing with that was of a standards suitable for a professional organisation, as well as learning the technical skills required to analysis and understand the data that I was working with.

To overcome these challenges I was initially paired up with undergraduate who had been working at United Energy for some time. He gave me a run though of the software packages that I used as well as proving a background of the technical jargon that I dealt with. In addition to this introduction I used many other resources to overcome challenges I faced. If I was unsure of how to do something I used online tutorials and research to provide me with the understanding required to complete my task, if this was not sufficient I then asked my supervisor or relevant co-worker the best was to proceed.

To ensure that my work was up to a professional standard I would always proof read the documents and attempt to use language that was suitable for a professional workplace.



Shane Holcombe – Wilson Transformer Company

Executive Summary:

This report aims to detail my time at Wilson Transformer Company as an intern, attempting to create a program that would accelerate the way in which an indicative price for a transformer was generated. During my time at Wilson Transformer Company creating this program, problems such as data analysis and sorting, search algorithm creation and program optimisation all arose and had to be solved. To effectively sort and condense 10 years' worth of data, intelligent data extraction techniques had to be employed to correctly find the data and compile it all in a time efficient manner. When searching for a transformer inside the database, time again had to be optimised for to allow users to compare many different potential specifications rapidly and this was accomplished through carefully used programming techniques. I would recommend that before this program be fully used to price out a customer's transformer, it first be run in conjunction with existing pricing techniques in order to gauge its effectiveness against real test data, allowing potential discrepancies in prices for individual areas to emerge and be rectified before relying on the program.



Ross MacAndrews – Wilson Transformer Company

Executive Summary:

The purpose of this report is to detail the projects I completed during my time at Wilson Transformer Co and the benefits generated for them and myself.

My projects included;

1. Creating a new Process Plan for their test department
2. Review and update of the document controlling all standards for all tests performed
3. Review and update of the individual test procedures

These assisted in creating a solid starting point for the projects and will allow Wilson to continue the work as required. My work is helpful in assisting the company with their goal of NATA certification.

- Research Report – *“Recommendations for Standard Site Acceptance Testing of Power Transformers”*.

My research and recommendations into the SAT capabilities provide a guide to assist the staff at Wilson with the creation of an essential company standard for routine on-site acceptance procedures. This will allow the company to save time on the SAT test plan creation process, it will ensure the customer knows that their transformer has been delivered, checked over and confirmed to be operating efficiently and safely. Wilson will be able to use this during the SAT process and look at what they need to achieve from both their own and the customer’s perspective, and make better informed decision about the process they want to follow.

Each of these projects was successfully completed, with good results and benefits Wilson Transformer Company, and myself, as detailed within.



Leon Chong – Western Power

Executive Summary:

This report summarises my 12-week vacation work experience at Western Power Head Office, within the Customer Connections Team. It provides analysis and discussions of the various projects I have worked on during my time of employment, and details the life-lessons I have acquired. I have gained both technical and practical knowledge of electrical power engineering, ranging from technical understandings of transmission and distribution networks within the SWIS, to the value of regular team meetings. This once in a life time experience for me has helped me mature as an individual, showing me that learning new things is part of everyday life and will keep life interesting.



Ananya Chaturvedi – Western Power

Executive Summary:

Throughout the duration of my second placement at Western Power as a vacation work student, I was working for Asset Strategies and Risk team within Asset Performance business of state owned corporation Western Power. Located in the head office in Perth City. Here, I learned key points about the risk mitigation, strategies, procedures and standards that are followed by the largest utility company of Australia to ensure that the overhead lines are not only suitable for their intended purpose, but also provide acceptable levels of safety before during construction, maintenance, and operation as well as meeting requirements of environmental considerations. My role in the company involved working on several strategies which enabled me to gain a good understanding of how different assets in the network are performed, maintained and operated. Also, I was fortunate enough to accompany engineers to several sites including various terminal substations. These visits to substations and various sites gave me a good understanding of the process and asset components as used in a utility and enhanced my knowledge of the network.

I also learned during my stay that safety is a crucial component of Western Power. This was instilled in me when I was assisting the Asset and Risk Engineer on the Network Safety Strategy. I was asked to go through over a hundred strategy documents and prepare a small summary on each and this has opened me to a world of knowledge and information that is so unique to Western Power and even just the Asset Performance team. Being a general member of the public, one doesn't get to appreciate the work that goes on to maintain the equipment that is put in the network to provide us with the electricity we take for granted:

Overall, my return to such a major utility firm taught me how each section is incomplete without the others hence being interdependent on each other for their skills and knowledge. It has truly opened several pathways and opportunities I didn't know existed, and for this I would like to thank Western Power and the Australian Power Institute.



Adam Dyson – Western Power

Executive Summary:

This report details the activities undertaken by API bursary recipient Adam Dyson during the practicum placement at Western Power, the power utility in Western Australia; objectives of the work placement, benefits to both student and host organisation and reflection are discussed.

Engineers Australia, and indeed peak bodies around the globe highly recommend students being placed within a host company to learn the machinations of the industry in which they are hoping to commence a career. There is much to be gained within such a practicum experience; valuable engineering experience being only the beginning. It is possibly more valuable to gain industry contacts and the possibility of further employment.

This practicum was a very positive experience, with a largely positive set of experiences and learnings. It also continues to be this, as the vacation student contract has twice been extended due to the student's suitability to the team. There was however, significant challenges, as with any job in which real learning takes place. Such challenges may involve an external team arriving to a work site expecting a very specific tool for a specialised process, which is not in the expected location, or simply attempting to organise a planning meeting for a combined work schedule with more than ten groups of stakeholders involved – which requires a trade-off between wanting all groups at the meeting and the reality of that sometimes not being possible. Resolutions of such things are where the learning occurs; does the tool come from the east coast via courier at high cost? Does it get manufactured in Perth with time being the sacrifice? Do you plan the meeting a month in advance to involve all stakeholders? Will some have to decline the meeting at the last moment anyway? Team leaders and supervisors are incredibly helpful in this regard, it is their experience and of others around a team that creates the great learnings that are possible at a corporation such as Western Power.



Jerome DeVera – SA Power Networks

Executive Summary:

My twelve-week engineering vacation program with SA Power Networks broadened my technical knowledge on the state's energy industry, and the economic and social impacts it has in the community. As a third year engineering student, the work experience helped fulfill my academic requirements to undertake a 60-day full time work within the engineering industry. Thus, throughout my time within the company, I was able to demonstrate my engineering competencies and put theory into practice.

As an undergraduate engineer in Network Planning, I was responsible for providing load study advice, assisting with electrical load forecast, updating the macro on excel data sheets and drafting project documents such as Concept Brief, Scope for Estimate, Specification for Design and Business cases. These tasks allowed me to gain understanding on how the different departments work together to implement a capacity project; from different planning groups (Generation, Substation, Protection & Control, Distribution, Telecommunications and SCADA), to Project Managers, Engineering Design and Finance.

The past three months have boosted both my personal and professional development and increased my employability skills in the power industry.

I am grateful to SA Power Networks for accommodating and providing me with rewarding experience for the industry work experience. In addition, this opportunity wouldn't have been possible without the support of API who continually develops aspiring power engineering students to be industry ready. Thank you!