



The Inverse Times

Tesla Consultants

Specialist Consultants to the Electric Power Industry



June 2020

In this Issue

- 1** - From our Managing Director
- Christchurch Office Re-Location
- 2** - HV Cable Thermomechanical Forces Analysis
- Recognising Service
- Customer Asset Review
- 3** - Control and Instrumentation Engineering
- Bus Charging Station - Solution Study
- Power Engineering Excellence Trust (PEET)
- Hamilton Office Environmental Initiative
- 4** - GXP Transformer-Feeder Protection Documentation
- UPS Replacement
- Retirement Celebrations
- 5** - Hands-on Introduction to IEC61850
- Draughting Team Expansion
- BESS Protection Design
- 6** - Graduate Engineer
- Contact Us
- Board of Directors



Alan Wallace

From our Managing Director

Tesla has continued to grow in strength over the past year, building up strong engineering teams in all of our four CBD offices. Some of this expansion is to meet client demand for our specialist services, but it is also a key element of our succession plan, ensuring we have a flow of highly experienced engineers available for the future.

Targeted recruiting has brought our team to a total of 35 expert engineers, with a Design Draughting team of 9, all focussed uniquely on the New Zealand Electrical Industry. We believe we have one of the largest teams of this speciality available in New Zealand.

Covid-19 is on everyone's mind at the moment, and Tesla was able to easily enact our pre-defined emergency response plan to continue to provide all client services from home offices. Modern technology allows easy desk-to-desk collaboration, and the ability to share this with all clients was a great success. Along with all New Zealand we are now enjoying our return to something more like the "old normal".

A special announcement this month is that Sean Lewis has joined Tesla as our new General Manager.

Sean is an accomplished leader of engineers and technologists and comes to us with 25 years' experience of managing multi-disciplinary teams in the New Zealand Electricity Supply Industry. He is based in our Hamilton Office and will soon spend time at each of our offices in Auckland, Wellington, and Christchurch. I look forward to the opportunity to introduce Sean to as many of our clients as possible, but you are welcome to call him for a chat on 021 345 300.

In a few weeks I will be standing down from my role of Managing Director, passing the baton to Sean. I will then be moving to a new Business Development role, assisting Sean and keeping in touch with our wide range of clients.



Sean Lewis



Christchurch staff outside their new office premises (left to right); David Collins, Garry Rodgers, Julien Arts, John Wraight, Karla Smith, Bevan Cooper, Jonny Lung, Nebiyu Tsegaye and Matthew Hall.

Christchurch Office Re-Location

After many years of operating a small office in Acheron Drive, the rapid growth in numbers of Christchurch based Tesla staff has necessitated the relocation to a larger office. In early 2019 we moved to our new premises at 210 Hazeldean

Road, Sydenham and since then our numbers have continued to grow.

Our Christchurch group now includes highly experienced Substations, Protection, Comms and Draughting resources, with 10 staff based there at this time.

HV Cable Thermomechanical Forces Analysis



David Spackman

Tesla was approached by a client to carry out calculations of the thermomechanical forces which would be generated by a new HV cable system. By allowing for these forces in the design of the cable routing and cleating arrangement, the reliability of large conductor power cable systems can be improved.

Leading this project from Tesla was David Spackman who joined Tesla in 2019. David is a chartered electrical engineer with over 12 years' experience working in the electricity industry across transmission, distribution and generation utilities. He has worked in New

Zealand and the UK as a project coordinator, project engineer, and most recently as a design consultant. His skill sets includes HV power cable systems, HV substation and power station design and feasibility and concept design studies.

Tesla offers specialist design services for MV, HV and EHV power cables, that include:

- Cable rating
- Distributed Temperature Sensing systems
- Cable system specification
- Tender evaluations
- Magnetic field calculation
- Induced voltage calculations
- Calculation of thermomechanical forces
- Sheath bonding system design
- De-rating at cable crossings
- Cable commissioning test specification

Along with other very specialised tools, Tesla uses Quickfield finite element analysis software to build thermal models of complex cable installation environments.

Customer Asset Review



Andrew Whitehead

Tesla is assisting Transpower with a process of improving the way information on customer assets installed at Transpower sites is handled. Transpower maintain a schedule of customer owned equipment, as part of their Transmission agreements with customers. As part of a broad support engagement, Tesla is carrying out a detailed review of the current data within schedules and associated records and is assisting with the capture of any missing site information.

Tesla's Design Manager for this engagement, Andrew Whitehead is working with Tesla's design and newly expanded draughting teams to update the records on a list of 20 high priority sites before the process is rolled out wider to the network. Andrew joined Tesla in February 2020 bringing 12 years of experience working in the electrical generation, transmission and distribution industry in New Zealand and Australia. Bringing significant Project Management and Electrical Engineering experience, Andrew works within Tesla to provide specialist Project and Programme Management coupled with Technical Engineering and Design skills. In joining Tesla, Andrew has further reinforced Tesla's capability to take on complex, technically challenging programmes of work.

Tesla Consultants have also been engaged to assist Transpower in assessing and processing applications for Access and Occupation changes. Bringing both initiatives within Tesla provides the opportunity to identify improvements across the historical data the applications process. While carrying this out Tesla can identify and implement improvements that provide efficiency benefits to Transpower and their customers and contractors. Tesla is proud to be supporting Transpower in their development of a safer and more efficient service for their customers.

Recognising Service

A special aspect of Tesla's culture is that it is rare for staff to depart. We are therefore very proud of the length of service our staff achieve, ensuring continuity of service excellence and detailed knowledge for our clients.

Over the past 12 months we have issued Distinguished Service certificates to Geoff Torr, Paul Rowland and Chris Schinkel for 25 Years each, plus for Matthew Hall and Pieter van Dyk for 10 years each.



Control and Instrumentation Engineering



Mark Macdonald

Tesla has considerable experience in the development of several Geothermal Power Stations in New Zealand. This includes Control and Instrumentation, Electrical, Generation and Protection related services.

A recent engagement involved the design of the Electrical, Control and Instrumentation, and miscellaneous services for a major upgrade of a large existing Geothermal Power Station. Working closely with Mechanical and Civil designers engaged by the client, Tesla handled all related design and interfaces with other providers for this project.

Mark Macdonald, who joined Tesla in 2019, was heavily involved in this project. Mark is a specialist in control systems and has been involved in the New Zealand electricity generation industry since 1976. His background includes comms installation, control and protection systems, hardware and software design, programming and installation of PLCs, as well as the design, installation and commissioning of generation sub-systems such as digital governors, AVR's and protection.

Bus Charging Station - Solution Study



Jonny Lung

A distribution client was recently asked to provide a new 500kVA substation to supply a new electric bus charging unit.

Tesla were engaged to complete a solution study to identify options for delivering the selected network configuration and advise on limitations and advantages and as well as alternative options for delivery.

The study assessed feasibility and provided an indicative scope for delivery, including materials, timeline, equipment physical layout and dimensions as well as detailed cost estimates.

The study verified existing supply configurations, constraints, contingency scenarios and back feed capabilities.

Leading this project from Tesla was Jonny Lung who joined Tesla in June 2019 and brings with him 6 years of experience within the New Zealand electrical distribution industry. Specialising in secondary and primary design, his experience includes Transmission and Distribution design, plus underground reticulation design along with cable rating studies. Jonny is located in our Christchurch office.



Power Engineering Excellence Trust (PEET)

The Power Engineering Excellence Trust, or PEET, is a unique partnership between the Power Industry and the University of Canterbury (UC).

Established in 2002, it is a charitable trust with representative from the various sectors of the industry - including generation, transmission, distribution, contracting, consulting and manufacturing. Its mission is to promote and support the education of power engineers and the study of power engineering as a field of excellence in New Zealand.

PEET supports the study of power engineering through an extensive scholarship scheme for undergraduate and postgraduate students, and through UC's Electric Power Engineering Centre (EPECentre) led events and activities.

Tesla Consultants has recently joined PEET as a member and looks forward to working with our peers for the promotion and support of New Zealand's future power engineers.

Hamilton Office Environmental Initiative

The latest environmental initiative to be implemented at our Hamilton office is a worm farm. Using food waste collected from the Hamilton tea-room we are aiming to further reduce the amount of rubbish heading to the landfill.

Thanks to Rukshan de Silva and David Spackman who spearheaded the idea. The natural compost generated is put to home use.



GXP Transformer-Feeder Protection Documentation



Hamish Moore

Tesla Consultants has an ongoing engagement to update grid exit point transformer and feeder protection relay setting documentation on a three-monthly basis. Using StationWare – DIgSILENT, along with Tesla created tools, we determine relay setting changes that have been applied since the last update. This engagement has been in place many years, providing consistency to our client.

The purpose of the grading charts and setting tables is to provide our client's customers with OC/EF settings and curves at the point where they take supply. Connecting parties use this information to ensure their own protection co-ordinates properly, and to understand what other circumstances on their network might lead to a trip, e.g. a high-impedance fault leading to a trip of GXP Neutral Earth Resistor (NER) thermal protection.

After an extensive period working as HV Power Technician in the electrical transmission environment, Hamish Moore has recently joined Tesla Consultants to train as a Protection Engineer.

Building on his in-depth practical experience with Protection, and under direct coaching by Tesla Senior Engineers, Hamish has quickly become involved in this project which will help him develop into more complex engineering as his experience grows.

UPS Replacement



Nebiyou Tsegaye

UPS installations vary in size and complexity and are pivotal elements of control system infrastructure operating electricity networks in New Zealand. Tesla's strong experience with UPS scoping and design includes a current project replacing existing UPS in a key Control Centre for a client.

Nebiyou Tsegaye joined Tesla this year, and is a key member of the design team for this project. Nebiyou has 6 years' experience in the New Zealand power industry, including primary design, secondary design and project management, transmission line protection design, preliminary studies for protection relay and RTU upgrades, and detail design of substation management system (SMS/SCADA) for transmission substations.

Retirement Celebrations



Dennis Parker

With a combined total of over 85 years' service to the New Zealand electrical industry Dennis Parker and Graeme Hope have both recently retired. Celebrations were held at the Tesla family weekend event in Rotorua and again at an industry function in Wellington.

Dennis Parker started at Tesla on 8 July 1996, and as with most of the early staff at Tesla was an ex DesignPower employee.

It wasn't long after Dennis joined that he became a Director. Dennis served on the board for 8 years from December 1996 until August 2004.

Our records show that during his time at Tesla, Dennis managed as lead engineer on more than 300 projects, with a very strong presence in the primary substation arena.

We have all been very lucky over the years to work with Dennis on these projects of widely varying size and scope. We are also incredibly fortunate to have been able to harness Dennis' industry knowledge over the last few years as he forewarned us of his retirement intentions. As always Dennis' pro-active attitude to ensuring "our young engineers know what they are doing", has resulted in the successful mentoring of engineers following in his footsteps.

Graeme Hope has been with Tesla since its inception, over 26 years ago. When Tesla was first started, Grant Thorburn and Richard Moore were looking to recruit the very best engineers to join them. From their time at DesignPower they recognised Graeme as one of the top protection engineers in the country and they asked him to join them, so he was there when the company was established in 1994.



Graeme Hope

While at Tesla, Graeme has been involved in all aspects of protection, transmission, generation and distribution projects. Graeme was often the lead protection engineer in complex projects and requested by clients to investigate complex trip events. Many times these resulted in lessons and advancements in setting work for the rest of the protection engineers at Tesla. Detailed knowledge of the impact of mutual coupling in distribution systems is but one of these learnings.

We have been very fortunate to have had a protection engineer of Graeme's abilities at Tesla. All of us have sought his guidance on various aspects of protection and he has always been very generous with his time, regardless of how busy he was.

From all of us at Tesla we wish both Dennis and Graeme all the best for a fulfilling and enjoyable retirement.



Maik Ufferhardt

Hands-on Introduction to IEC61850

At Tesla, we encourage the sharing of knowledge throughout the company by our engineers. One of our recent information sharing sessions covered the IEC61850 standard and the various parts that make up this standard. This training also included data

modelling, which is fundamental to the understanding this standard, as well as the manipulation of DataSets, GOOSE Control Blocks and Report Control Blocks.

The knowledge shared was further complemented with a

hands-on session, using real protection relays, providing additional experience with the application of data models, GOOSE, Reports and Controls.

Presenting this training was Tesla's Maik Ufferhardt. Maik joined Tesla in 2019, bringing with him considerable experience in the commissioning and maintenance of primary, secondary and SCADA systems. Maik is also very experienced with the analysis of transmission faults, earth testing, primary asset diagnostics/assessment and partial discharge testing.

Maik is working closely with several of Tesla's senior engineers, while under training as a protection design engineer.



Draughting Team Expansion

With the growth across our engineering capability we have expanded our Draughting Team to enable us to continue delivering the high-quality services our clients expect from us. We have been fortunate to have been able to bring on board two very talented junior draughtspersons, Frances Bouter and Christy Lion-Cachet. Christy and Frances have been with us for a year now, in our Hamilton office.

As well as typical substation works, both were involved in an audit of fibre patching within a client's major data centre, giving them invaluable learning experiences.



Christy (left), Frances (right).

BESS Protection Design



Nick Bowe

Tesla has assisted the rollout of BESS (Battery Energy Storage System) installations at several locations. Our involvement ranges from electrical design and control system integration through to designing their connection protection requirements. These large-scale dedicated battery storage systems provide a step change in

network performance for our Distribution Clients, but can come with unique protection design and setting requirements to maximise their potential.

Nick Bowe recently joined Tesla with substantial experience in power systems protection, conceptual design, coordination studies, protection system performance and incident investigation, and has used this knowledge within the design team for a BESS installation. Nick is also a skilled technical trainer, covering communications diagnosis of IEC61850 and DNP3 protocols and distribution network automation system development.

Graduate Engineer



Tyler Patterson

Tyler Patterson joined Tesla in November 2019 after completing his final year of electrical engineering at the University of Canterbury with a minor in power systems. His selected courses assisted him to develop technical knowledge in renewable energy design, power quality, control systems, power electronics, embedded systems design and electric machines.

During his final year at Canterbury, Tyler was involved in a project investigating the effect of increased rooftop PV penetration on New Zealand's transmission network and ascertaining how viable new battery management systems are through voltage response mode testing.

Tyler is based in Hamilton and gaining experience across many projects. Tyler is heavily involved in a current project undertaking Customer Site Risk Reviews throughout the country for a major client. Tyler has also been involved in multiple geothermal projects which is exposing him to design components from other engineering disciplines.

Contact us

Auckland

Phone: 09 953 3557

Email: auckland@tesla.co.nz

Hamilton

Phone: 07 834 6460

Email: hamilton@tesla.co.nz

Wellington

Phone: 04 831 1287

Email: wellington@tesla.co.nz

Christchurch

Phone: 03 741 6200

Email: christchurch@tesla.co.nz

Tesla Consultants is an engineering consultancy providing specialist engineering and related services to the electric power industry.

Board of Directors



Alan Wallace
Managing Director

☎ 027 495 4006

Email: alan.wallace@tesla.co.nz



Tim Crawley
Consulting Engineer

☎ 027 565 1236

Email: tim.crawley@tesla.co.nz



Mark Mullins
Consulting Engineer

☎ 021 448 205

Email: mark.mullins@tesla.co.nz



Geoff Torr
IT Manager/Design Engineer

☎ 027 436 9657

Email: geoff.torr@tesla.co.nz



Matthew Hall
Consulting Engineer

☎ 021 285 5504

Email: matthew.hall@tesla.co.nz

