NEWS AND VIEWS FROM PSC

Specialist Consultants
to the Electricity Industry

PSC NEWS

Helping our clients power the world

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Electricity Distribution Networks - PSC Focus

It is obvious that the electricity industry is changing at a fast pace. As alternative energy supply increases, electricity utilities have a new focus on efficiency and cost control, based on technology and innovation. This includes matching diverse low carbon supply (including wind, solar and batteries) with demand through sophisticated real-time systems and software.

PSC is seeing an increasing demand for our services in the electricity distribution sector. This includes working with our clients to upgrade their advanced distribution management systems and network analysis to study the dynamic behaviour of load and generation.

The advanced distribution management systems (ADMS) is the real-time software platform that supports the full suite of distribution network management and optimisation. PSC is expanding its team of technical specialists and can assist our clients with the following technologies:

- Automation tools
- Data aggregation
- IoT applications
- Mobile applications
- Outage management
- Crew management
- Offline analysis
- Reporting applications

PSC is vendor neutral and can work with established vendor software as well as standalone software used across multiple vendor platforms. Some of the client systems we are currently supporting include technology from ABB, Siemens, Schneider, GE and OSI. One area that PSC has considerable experience is the development of automation tools. One example was PSC working with a client to design and build a semi-automated model data entry tool that significantly reduces the manual effort required to perform model updates. The principles used to automate the model building steps with this client form the basis of a methodology that can benefit other utilities seeking to streamline their model updating process. PSC is also developing mobile applications that can assist clients with field applications such as mobile switching, incidents and equipment assessments.

PSC'S power networks engineers have extensive experience in the modelling, analysis and planning of distribution networks. More information about how we are assisting our clients with network analysis and dynamic studies can be found on page 2. The global nature of our business means our operational technologies and power networks teams collaborate to provide our clients with the right project solution.

For more information, please visit: www.pscconsulting.com

ALSO IN THIS ISSUE:

Power system dynamics in distribution systems

Historically, in large electricity grids, generation is rarely found within the distribution system, but is rather connected remotely via a high voltage transmission network. With the trends seen in the transformation of the grid, generation embedded in the distribution system is now becoming the norm, rather than the exception, and can include wind, solar, and batteries, as well as conventional diesel and hydropower units.

The power systems analysis for traditional distribution systems has focused on load flow and short circuit studies. Dynamic studies have typically not been required because the loads have a passive characteristic with little generation. However, distribution systems now supply an increasing amount of active loads such as adjustable speed drives, and also host generation, much of which is inverter connected.

Consequently, there is now an increasing focus within distribution utilities on the dynamic behaviour of load and generation, both existing and prospective.

PSC's Power Networks engineers have extensive experience in the modelling, analysis and planning of transmission and distribution networks, and we have developed a strong reputation with our clients. With an increasing demand for network analysis in the electricity distribution sector, PSC have a team ready to meet the requirements of these complex studies.

PSC's team includes experts in power system dynamics, who are immersed in assessing how well both transmission and distribution networks maintain stability under disturbances. As an example, by carrying out dynamic simulation studies of electromechanical transients, we are supporting proponents and distribution utilities in assessing whether proposed new generation projects meet the stability criteria of Australia's National Electricity Rules. PSC works closely with our clients to ensure all final reporting meets the applicable regulations, and we can also provide assistance with network connection applications or modifications.

Back to the future for Tony Armstrong

Many of the PSC clients are asking what Tony is up to since the management buyout and the recent governance changes. Tony explains this as being like 'back to the future'.

"I am extremely proud of PSC and the fact that Ranil and I started with an idea almost 23 years ago and today PSC is a small multi-national consultancy employing 160 staff, and even more proud that the company has a strong management team to take PSC to the next level."

When PSC was founded in 1995 Tony spent the first 5 years as a billable consultant before turning his focus to the growth and expansion of PSC internationally. He considers that he has now gone full circle and is now back at the start point where his next change is back to being a billable consultant providing governance and leadership advice to company boards and start-ups. PSC is pleased to announce that Tony has accepted another board position and joins the leadership team on the Tekron board.

Tony currently holds board positions in the following Electricity Industry companies:

PSC
Specialist Consultants to the Electricity Industry

pba THE HIGH VOLTAGE EXPERTS

TEKRON

cigré AUSTRALIA

Going forward, Tony intends to continue helping businesses through board engagements or via targeted assignments.

"It is enjoyable advising people on how to run and improve their business, it's even more rewarding when you witness them benefit from success."

In his new board role, Tony's strong international electricity industry experience will benefit Tekron with their future strategy and business planning.

Tony Armstrong joins the Tekron board

Tekron International is a New Zealand based company that specialises in high precision GPS and GLONASS Satellite Clocks, Rubidium Atomic Clocks and Stratum 1 Network Time Server solutions. With equipment installed in over 70 countries, Tekron's cost effective and highly reliable time keeping technologies and consulting services enable synchronization of mission critical applications including national power grids/substation automation, digital broadcasting, telecommunication and enterprise networks.

Idaho Power follows best practices for root cause analysis

Idaho Power is an electric utility engaged in the generation, transmission, distribution, sale and purchase of electric energy in the United States of America. Idaho Power serves more than 545,000 customers across a service area spanning an estimated 24,000 square miles in Eastern Oregon and Southern Idaho.

When a circuit breaker fails, it demands swift action to identify the root cause and rule out serious issues like faults in the system. When one of their breakers failed, Idaho Power understood the importance of investigating the cause of failure. As specialists in power system modeling and simulation, PSC was able to help Idaho Power examine the cause of breaker failure to ensure the utility could maintain the safe, reliable delivery of electric power.

PSC North America recently completed a study for Idaho Power to investigate the root causes for a breaker failure incident. A phase to ground flashover occurred in one of the phases of the said breaker after it was closed in order to energize the connected 345/230 kV autotransformer. PSC modeled the substation in detail using data provided by Idaho Power, and ran numerous electromagnetic transient (EMT) simulations on PSCAD™/EMTDC™ to determine if inrush, prestrike, or current chopping phenomenon could have caused extremely high voltages to compromise the insulating properties of the dielectric medium of the circuit breaker.

These tests found that none of the simulated scenarios produced large enough transient over-voltages to exceed the switching insulation withstand level of the circuit breaker because of switching transients. PSC also performed energization based on the synchronous closing logic for the transformer, concluding it was suitable as no excessive inrush current or over-voltage would be produced.

Based on PSC's analysis, Idaho Power was able to rule out any lingering system issues that could cause problems when energizing the transformer with a new breaker with synchronized closing.

"PSC worked closely with Idaho Power to develop a holistic understanding of our system context," said Orlando Ciniglio, System Planning Lead at Idaho Power.

"PSC's expertise in power system simulation gave us the confidence to proceed with transformer energization, when system issues were ruled out."

Following best practices for root cause analysis allowed Idaho Power to quickly replace the lost breaker while ensuring safe, reliable service for their customers.

IDAHO POWER®
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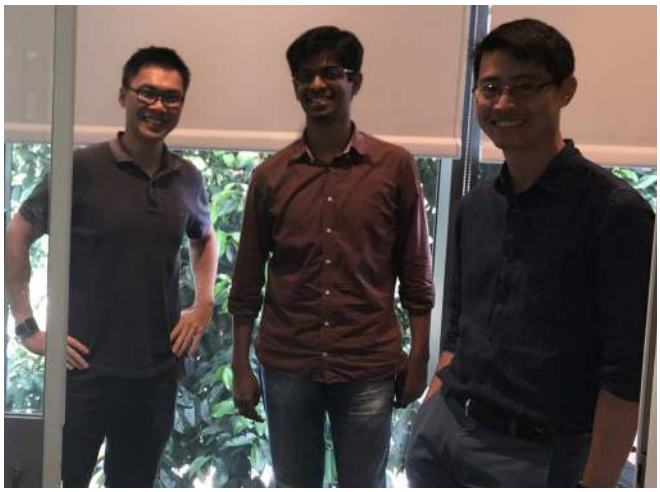
PSC expansion in Asia

PSC is pleased to announce that Dr Keehan Chan has been appointed as the General Manager of PSC Asia and will be responsible for our business operation in the Asia region. Keehan joined PSC in 2011 and is an experienced electrical engineer with extensive knowledge in electrical power engineering covering many different industries including electricity utilities, the oil and gas industry, large industrial plants, power generation plants, transmission systems, regulatory agencies and academic institutions.



The PSC Asia team - Keehan Chan (L), Sumith Madampath (C), Tri Huu Le (R)

Keehan's areas of expertise include power system studies/ analysis, transmission and distribution planning, managing and implementation of transmission and distribution projects, pre-Front End Engineering studies for electrical works and the preparation of technical specifications and tender documents. Keehan holds a PhD and BEng(Hons) 1st from the University of Glasgow in the United Kingdom and completed a Master of Business Administration (MBA) from Manchester Business School. He is also a chartered professional engineer in the United Kingdom and Australia.

PSC is working with our clients throughout Asia and has developed several client relationships so we are a trusted adviser. Some of our recent projects include:

- Voltage stability study to assess the reactive power requirements in a client's network.
- Review reliability performance of a client's power network with a focus on their distribution network.
- Modelling and validation of gas turbine frequency test response.
- Develop models of gas turbines governors based on OEM block diagrams.
- Study the impact of large scale solar on reserve requirements.
- Generation and load dispatch study for a transmission network.
- Assessment on the impact of large generator and network transformers energisation.

As part of our expansion in Asia, the team has moved to a new serviced office in Shenton Way in Singapore. The office is in a prime CBD location adjacent to the Tanjong Pagar MRT station and offers easy access to supporting facilities. For more information on how PSC Asia can assist you, please contact:

Keehan Chan - General Manager PSC Asia
Email keehan.chan@pscconsulting.com

Return of the Jedi...

PSC is pleased to welcome back Naresh and Stephen who have re-joined PSC in New Zealand.

NARESH KUMAR

Naresh is a SCADA Engineer and has extensive experience in SCADA and IT applications support, analysis, software development, integration testing and implementation. This included system integration for the Meridian Energy Generation Control System (GCS) project and he was also involved in database, scripts and displays migration, the development environment, and technical support during the project. Naresh will be based in our Auckland office supporting our electricity distribution clients.

STEPHEN BUTLER

Stephen Butler – Stephen returns to our Wellington office in the power networks team. Stephen has engineering experience on global HVDC projects which includes detailed subsystem testing and commissioning management. His last PSC assignment was the commissioning manager for the Spittal 275/132 kV substation project in Scotland. Stephen will be providing engineering support for our clients in New Zealand and Australia.

Mark Gilchrist celebrates 20 years of Excellent Service with PSC

During April 2018, Mark Gilchrist achieved a significant milestone in completing 20 years of excellent service with PSC. Mark joined PSC as a Technical Specialist and initially worked on several projects including site engineering for a substation flood mitigation project, project management for a major gas network uprating project in the Wellington region and project management for the substation equipment upgrades for several thermal uprating projects for key transmission lines throughout New Zealand.

PSC Co-founder Tony Armstrong (L) and Mark Gilchrist (R)

In recent years, Mark has focussed on HVDC projects, specialising in site management and commissioning management. He has worked on numerous HVDC projects in many countries around the world. This work has included subsystem testing on all primary and secondary plant, site management and commissioning management.

From China, Norway, Finland and Wales through to Zambia and the Congo, Mark has been heavily involved in the commissioning of these projects. He is held in very high regard and his most recent project has been the 800kV 6000MW North-East Agra HVDC link (one of the largest in the world) that transmits hydroelectric power from India's northeast region to the city of Agra.

The PSC Management team congratulates Mark on 20 years of excellent service with PSC and thanks him for his dedication and commitment to all of the projects he has been involved in. Mark was in New Zealand and a small social event was held to celebrate this achievement – well done.

Mark's HVDC project highlights can be viewed on the PSC website > www.pscconsulting.com/features/MG-20-years-projects

Martin and Kim at the Commonwealth Games in Australia

Kim and Martin in their Commonwealth Games volunteer's uniforms

The 2018 Commonwealth Games, officially known as the XXI Commonwealth Games were recently held on the Gold Coast, Queensland, Australia, during April 2018. PSC's Martin Stacey and his wife Kim were both volunteers for the games.

Martin was a volunteer driver at the Athletes Village taking officials, athletes and their families plus the media, to venues on the Gold Coast, airports, hotels and theme parks. Kim's role was as a Host City greeter and information person at the Broadbeach precinct, which was in the heart of the spectators area on the Gold Coast. Kim even got to meet many of the medal winning athletes and shake hands with Prince Charles and Camilla at Broadbeach.

Martin Stacey is an Executive Consultant with PSC Australia and has over 20 years' experience as a leader and manager developing operational technology strategies, teams and solutions for the business functions of electricity distribution, transmission and generation.

PSC WELCOMES NEW STAFF

SANDI LISANTI

PSC Group is pleased to announce Sandi LiSanti to the position of Chief Financial Officer. We are excited to welcome Sandi to the PSC team where she will undoubtedly make an impact as we work to optimize the financial performance of PSC for our shareholders. Sandi started in March 2018 in the North American headquarters office in Kirkland and then made the long trip down to visit the Finance team in the Tawa office in New Zealand. Sandi will spend time getting familiar with the complex structure of a company with a presence in eight countries. Sandi has over 15 years experience in Seattle and British Columbia. Most recently, she held the top finance position at Artefact which, like PSC, is a professional services firm. Sandi has a proven record of increasing financial performance of companies she has worked at in the past.

ROB FAIRCHILD

PSC North America is pleased to welcome Rob Fairchild to our team of expert consultants. Rob joins PSC as a Senior Consultant with a broad range of experience across all aspects of the Energy Management Systems environment. His strengths in both Power System Engineering and Software Development are a powerful combination. Prior to joining PSC, Rob spent the last 18 years working with GE Grid (formerly Alstom) in various roles, culminating in the lead role of the DTS (Training Simulator) group. Prior to GE, Rob worked with PowerData Corporation.

JUAN PABLO CASTANO

Please join us in welcoming Juan Pablo to PSC! Juan is a Senior Structural/Transmission Lines Engineer in the Melbourne office. Juan has 10 years engineering experience, 6 years in Industrial structures, temporary structures, power generation and transmission lines projects in Australia and 4 years in telecommunication and structural projects back at his home country Colombia. Juan's most recent experience at Pitt & Sherry turned him into a design/project manager for the initial phase of the West Gate Tunnel Project Temporary works, as well as structural design lead for clients such as Yarra Trams, STA, A2 Milk and Parmalat.

IAN HULME

Ian Hulme joins PSC as a Principal Engineer in the Transmission Line team, based in New Zealand; bringing work experience and skills, both technical and managerial, gained from his engineering career in the United Kingdom, Australia, the Middle East and the Mediterranean, to complement the existing team's solid capabilities. Ian is a professional Chartered Engineer with more than 30 years' experience working as a consultant in the power transmission, communications, broadcast and cellular markets; and will be continuing his work of the last 10 years providing line and civil design for principal clients, such as Transpower, ElectraNet and AusNet on transmission line and substation new construction, upgrades and refurbishment projects.

BHARGAVI DEVARAJAN

Bhargavi Devarajan has joined PSC's Power Networks group in Westborough, Massachusetts! Bhargavi has more than 8 years of experience working in the power systems domain, primarily performing power system modeling and analysis. Most recently, she worked as a Senior Transmission Planning Engineer for National Grid. She will immediately begin leveraging her expertise to support our North American clients with power system studies.

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