NEWS AND VIEWS FROM PSC

Specialist Consultants
to the Electricity Industry

PSC NEWS

Independent expertise and engineering solutions for utilities and energy companies

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Power System Studies - Harmonic analysis in a meshed network

Transmission and distribution system operators are responsible for maintaining harmonic voltage distortion within statutory limits in their own networks. The rapid growth in new technologies and renewable generation suggests that the modern network is undergoing significant development to accommodate a growing number of customer connection applications.

EirGrid (the company that operates and develops the national high voltage electricity grid in Ireland) have been working on a number of new customer connection studies that required simultaneous analysis in a heavily meshed area in their network. EirGrid have engaged PSC to work with them to develop the models to calculate and specify emission limits for the different customers including how these new customer connections will have an impact on each other and the surrounding network. These assessments resulted in customers being supplied with emission limits in a timely manner.

In the ongoing analysis PSC has considered the use of two methods in determining the amplification of existing distortion on the system. This study was developed in conjunction with EirGrid and Energinet (the Danish equivalent of EirGrid) as a comparative analysis in order to establish the best approach in such calculations.

CIGRE Symposium Aalborg, Denmark

PSC, EirGrid and Energinet have produced two technical papers – "Challenges of Harmonic Distortion Limit Allocation to Multiple Customers in a Meshed Network using IEC TR 61000-3-6" and "Calculation Method Selection for Harmonic Voltage Distortion Gains".

PSC will present both papers at the CIGRE Symposium that will be held in Aalborg Denmark between the 4th and 7th June 2019. As part of our commitment to continuous staff development and information sharing within the electricity industry, PSC maintains an active role in CIGRE (International Council on Large Electric Systems).

The global nature of our business means our system studies teams can provide our clients with the right project solution anywhere in the world. Our system study specialists have extensive experience in the modelling, analysis and planning of transmission and distribution networks. For more information, please visit *www.pscconsulting.com*

cigré Symposium Aalborg, Denmark
4th-7th June 2019

ALSO IN THIS ISSUE:

A Tribute to our Founders

In 2017 the founders and existing shareholders of PSC completed a management and staff buyout that has consolidated all of PSC's operations as a single, global entity. As part of the transition, our founders Tony Armstrong, Robyn Armstrong and Ranil de Silva continued to provide leadership to PSC in key management roles for a period of two years. At the end of March 2019, Tony, Robyn and Ranil completed their full-time transition period.

PSC founder Tony said, "I am extremely proud of PSC and the fact that Ranil and I started with an idea in 1995 to provide high quality engineering consultancy and today PSC is a small multi-national company employing 160 staff, and even more proud that the company has a strong management team to take PSC to the next level."

CEO of PSC Alex Boyd shared his thoughts, "Having been at the helm of PSC North America for over 10 years, it has been a pleasure working with Tony, Robyn and Ranil – they can take a huge amount of credit for making PSC what it is today. Their vision has built a great team and the staff of PSC thank them for 24 years of excellent leadership across the globe. We look forward to helping our clients by continuing to provide the high-quality, independent, specialist engineering services that PSC is known for."

PSC Founders Tony Armstrong, Robyn Armstrong & Ranil de Silva

Electromagnetic Transient Simulations for Urban Transmission Network

PSC recently helped a transmission system operator gain critical insight about the impact of planned underground cable reinforcements in an urban region on the risk of temporary overvoltages in the network, while improving their electromagnetic transient (EMT) models.

The Challenge

Continued interest in large commercial demand connections in and around the client's network has created a need to reinforce the transmission system. Due to the urban nature of the locations where development is required, it is likely that any circuit reinforcements will be underground cable. Introducing long lengths of AC cable at HV and EHV can cause harmonic distortion issues and temporary overvoltages (TOV).

The client wanted to understand the impact that planned developments around the region would have on the risk of TOV. To do this, the client sought simulation practices that considered the influence of variable network characteristics on harmonic distortion and TOV studies – but first, they wanted to confirm that their Electromagnetic Transient (EMT) simulation approach was consistent with industry best practice.

Our Solution

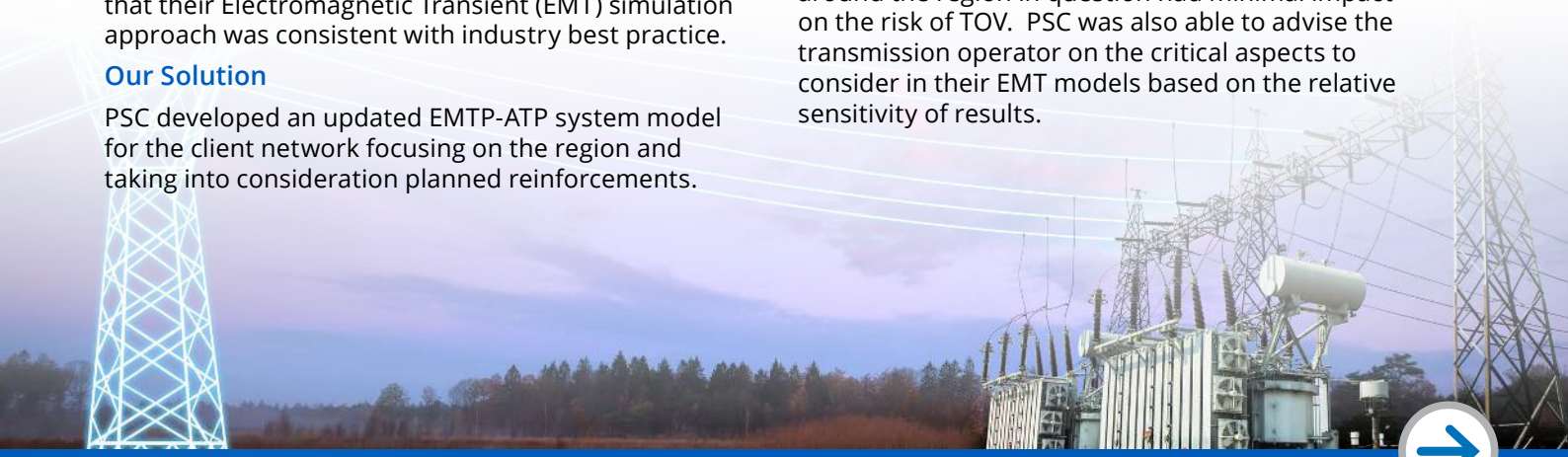
PSC developed an updated EMTP-ATP system model for the client network focusing on the region and taking into consideration planned reinforcements.

Frequency dependent characteristics of equipment and transformer core saturation models were included based on industry best practice. To investigate the sensitivity of results to network parameters PSC developed several automation tools to carry out frequency and time domain studies that covered different network parameters and modelling approaches including:

- Impact of load models and load composition
- Impact of modelling detail for the distribution network
- Impact of changing generation patterns and system reinforcement plans

Results

The results showed that the planned developments around the region in question had minimal impact on the risk of TOV. PSC was also able to advise the transmission operator on the critical aspects to consider in their EMT models based on the relative sensitivity of results.



PSC confirms major sponsorship of the 2019 EEA Conference

Following on from the success of last year's EEA Conference, PSC New Zealand has confirmed its major sponsorship of the 2019 Electricity Engineers' Association Conference & Exhibition to be held in Auckland from 25 - 27 June 2019.

PSC New Zealand General Manager Peter Brown

Operating for over 75 years, the EEA provides the New Zealand electricity supply industry with leadership, expertise and information on technical, engineering and safety issues affecting the electricity industry.

PSC as specialist consultants to the electricity industry is passionate about the same issues and as a result we are proud to be associated with this conference. The sponsorship is also a reflection of PSC's ongoing commitment to the New Zealand industry and fostering best practice.

The 2019 conference is the premier power engineering event for the New Zealand electricity supply industry. The aim of the conference is to provide a national forum for engineering practitioners and technical experts to examine and discuss industry issues, developments and technologies in the field of power engineering. Changes in engineering, new technology and market innovation are reshaping the global energy sector. New Zealand's focus is clearly on delivering a low carbon economy, smart energy and enabling emerging technologies.

PSC's New Zealand General Manager Peter Brown will be a keynote speaker at the conference and one of our engineers will be presenting a technical paper on the Integration of Remote Offshore Energy with High Voltage Direct Current (HVDC). A team of delegates from PSC will be in attendance at the conference and we hope those of you also attending will make yourselves known to us.

PSC WELCOMES NEW STAFF

MATTHEW ROBINSON

PSC is pleased to welcome Matthew Robinson as General Manager – Operational Technologies and Market Systems, Asia Pacific. As an industry leader in power engineering and project delivery, Matt has spent the last 20 years working across the full spectrum of traditional electricity supply and generation in Australia, United Kingdom and the United States. He has delivered numerous complex projects, developing power systems for remote mines and delivering capex projects to the major network companies in Australia. A specialist in the design of distribution networks and project managing their delivery, Matt has also advised government and industry stakeholders on energy strategy and project development. Matt will be based in our Melbourne office.

JOHN CAMILLERI

We are excited to announce that John Camilleri has joined the PSC team as an Account Manager based in Raleigh, North Carolina! John has a proven track record of product management and domain expertise in Utility Automation Systems, having worked in the electric utility industry for over 25 years. He has worked for both utilities and the product vendors that supply their operational technology. As an expert in the electricity industry, John has delivered numerous papers and presentations, contributed to standards bodies and supported the recent growth of distributed peer-to-peer processing in the energy field. John supports customers with SCADA/EMS/DMS technical and management leadership, as well as advising on microgrid control systems and integration of DER.

MICHAIL BITOS

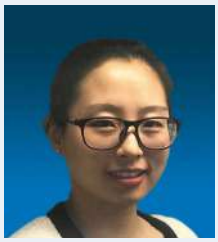
PSC welcomes Michail Bitos to the PSC Warwick office in the UK. Michail is an experienced electrical power systems engineer and has a multi-disciplinary background in the electrical energy field, with comprehensive knowledge of power systems, electrical power networks, renewable energy technologies, distributed generation, power electronics and control systems. More recently he has been specialising in power systems analysis and development of power conversion systems utilising power electronics, with a particular focus on HVDC transmission systems and grid integration of large-scale solar PV and energy storage systems.

PSC WELCOMES NEW STAFF

CHRISTINE GILLASPIE

We are pleased to announce Christine Gillaspie has joined the HR team in our Kirkland, Washington office. Christine brings with her a diverse professional background that began with her service in the United States Air Force. She then worked at the American Red Cross in Germany as a Field Office Coordinator where she assisted in getting deployed soldiers and airmen home as quickly as possible. Christine then moved back to the United States and began working at the University of Idaho, where she ultimately got her degree in Human Resource Management before joining a unique collectibles company called Funko.

FANG FANG



PSC welcomes Fang Fang to PSC North America as an Associate Power Systems Studies Consultant. Prior to joining PSC, Fang was a EIT in the interconnections – system planning and assets management group with SaskPower where she performed system impact studies for new generation interconnections, validated generator models and participated in transmission planning studies. Fang will be joining our Power Networks team based in Vancouver, BC.

PRIANK CANGY

PSC is pleased to welcome Priank Cangy who has just started with the Power Systems team in Australia. Priank started in April and is based in Melbourne. Priank is a Power Systems Engineer and he joins us from Arup Energy. Prior to that Priank worked in the United Kingdom with RINA (formerly EdifERA London Power Associates). Priank's experience includes grid connection studies, protection coordination, insulation coordination and harmonic assessment.

DR JULIAN SWARTZ

PSC welcomes Julian Swartz who started in April with the Power Systems team and is our new Technical Director for Power Systems Engineering in Australia. Julian will be based in Melbourne and in addition to his technical role, will provide leadership and mentoring to the broader Power Systems team when required. Julian has a passion for staff development and is an accredited PTI PSSE instructor. Julian has nearly 20 years experience spanning engineering consultancies, electricity utilities and academia.

ANDRE LOU

PSC is pleased to welcome Andre Lou as a Graduate Market Systems Engineer. Andre has a Masters in Electrical Engineering where her thesis was on "Dissolved Gas Analysis Interpretation using Neuro Adaptive Fuzzy Logic". This is Andre's first role in the electricity industry and PSC is pleased to be able to provide this opportunity. Andre joins our Market Systems team in Western Australia.

STEVE RAYNES

PSC welcomes Steve Raynes to the Market Systems Team in Western Australia. Steve is an accomplished Principal Test Analyst who prior to joining PSC, has worked for AEMO, Synergy and Western Power in Senior, Principal and Management roles. Steve is a Certified Agile Tester, a certified Senior Test Analyst (through the ISTQB), a Prince2 certified Practitioner, and has a PMBOK Diploma of Project Management.

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