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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PSC Supports Virtual Statcom Innovation Project

Western Power Distribution (WPD) in the United Kingdom has engaged PSC to deliver an innovation project known as the Virtual Statcom project. The project is being run by WPD and funded under the Ofgem Network Innovation Allowance (NIA).

As an increasing number of Distributed Generators (DGs) connect to distribution networks, technical constraints arise that can limit the total amount of generation a network can host. To overcome the technical constraints associated with distributed generators and continue to operate a safe, secure and reliable network, WPD undertake traditional network reinforcements as well as initiating and leading innovation projects to develop new solutions. A key focus of innovation projects is to increase the utilisation of existing assets to defer network reinforcements, the Virtual Statcom project fits in this category of project.

The objective of the Virtual Statcom project is to determine the technical feasibility of increasing the network hosting capacity, for both generation and load, through implementing an algorithm to optimise and coordinate the reactive power output of existing generators in the distribution network. If the project demonstrates benefit, it will enable more generation and load to be connected to the distribution network without the need for network reinforcement.

PSC is working closely with WPD and will be responsible for the following aspects of the project:

- Data gathering/validation and study zone selection
- Power flow simulations and Virtual Statcom algorithm
- Graphical User Interface
- Time series comparison studies
- Virtual Statcom feasibility study reporting

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

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Protection Grading and Discrimination Studies

Power Testing Ltd (PTL) are undertaking works for several large industrial sites to deliver power system reinforcement and upgrade works. A component of these works requires a study of the existing system and protection scheme. PSC have carried out these system studies, reviewed the existing protection scheme and recommended updated settings where required.

Challenge

During fault conditions, protection schemes rely on suitable grading margin to ensure coordination and discrimination between different devices. If incorrect settings are applied the consequences can range from nuisance tripping of circuit breakers to unsafe operating conditions due to failure to operate. Suitable grading margin has to be achieved between all protection devices from the Distribution Network Operator (DNO) to the LV distribution boards taking into consideration the expected short circuit fault currents, the rated system currents and the minimum allowable grading margins between relays.

Solution

PSC developed system models for the industrial units and performed load flow and fault studies to determine the rated currents and short circuit fault currents along each potential fault path. Existing protective devices and protection settings were collected during a site audit and PSC developed appropriate relay models for protection studies in either PowerFactory or AmTech ProtechHV.

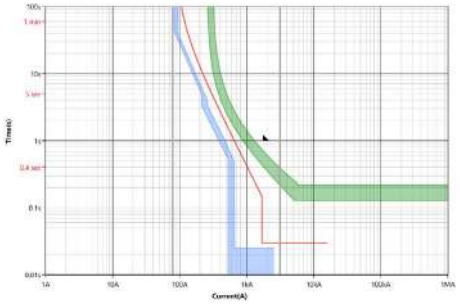
PSC reviewed the time-overcurrent curves for the existing settings indicated some insufficient grading margins and therefore potential for protection mal-operation. Alternative protection settings were proposed to ensure suitable discrimination between all protection devices for different operating scenarios and fault conditions.

Results

The assessment identified the cases where there were inadequate protection settings and indicated the potential risks during fault conditions. The revised settings ensured minimum protection operating times, reducing risk to equipment and personnel whilst also maintaining having sufficient discrimination to maintain site operations. The new protection settings and time-overcurrent curves demonstrated that safe discrimination exists in the complete range of short circuit currents for overcurrent and earth fault events expected at the site.

Testimonial

"PSC have completed a number of detailed reports for PTL and always in agreed timescales. All PSC staff are extremely helpful and flexible which ensures PTL offer our end users accurate and detailed reports. It is a pleasure working with such competent designers." Chris Williamson, Head of Projects, Power Testing Ltd.



Time-current protection grading curves for transformer over-current protection scheme

Stephen Butler Celebrates 10 years of Excellent Service with PSC

Stephen Butler has recently completed 10 years of excellent service with PSC. Stephen joined PSC in 2009 as a graduate engineer after completing his engineering degree at the University of Canterbury. PSC is committed to the development of engineers in the power industry and Stephen has gained a broad range of knowledge and experience on projects across the globe.

Some of the projects Stephen has worked on include:

- HVDC subsystem testing and commissioning on the Borwin 1 HVDC light project in Germany and the East West Interconnector in Wales
- New Zealand System Operator outage planning and analysis
- Dolwin 2 HVDC project in Germany - Offshore Wind Connections Commissioning Manager
- Spittal 275/132 kV Substation project in Scotland - Commissioning Manager
- Grid reliability forecast modelling and harmonic filter solutions

The PSC management team would like to thank Stephen for his commitment and excellent service over the past 10 years – well done.

Stephen Butler (C) alongside PSC New Zealand GM Peter Brown (L), and PSC Asia Pacific Managing Director Roger Riley (R)

The Future has arrived in New Zealand

Change is afoot in the electricity industry. Innovation in technology, evolving consumer expectations, increasing distributed generation sources, the explosion of big data, and regulatory commitments to renewable energy are all factors driving a massive reimagining of the electric power industry as we know it. At the 2019 Electricity Engineers' Association Conference & Exhibition in New Zealand this June, the focus was on the role engineering will play in bringing this new age of electricity generation and supply to life – and how they will grapple with this change in the future.

In many ways, that future is already here, says Peter Brown, GM of PSC New Zealand. In a keynote address delivered at EEA 2019, Peter asked attendees to embrace a new era in electrical power and challenged the New Zealand electricity industry to lead the world in building an electricity sharing economy and infrastructure.

PSC New Zealand GM Peter Brown presents at the EEA 2019 Conference


The PSC team at EEA, from L to R: Dale Hermiston, Peter Brown, Geoffrey Callander and Stephen Butler

"As its own set of islands, New Zealand is a great test bed for innovation in electrical systems," said Peter. "We have weather that drives renewable generation, and we have a strong, stable economy to support innovation. It's our responsibility as electrical engineers to ensure the next generation of power systems remains reliable, sustainable, and affordable."

Founded in New Zealand in 1995, PSC has been closely involved in the evolution of the New Zealand electricity industry for the last several decades. In the spirit of this continued commitment, PSC was proud to be the Major Sponsor of EEA 2019.

Circuit Breaker De-rating due to high DC Time Constants

Due to expansion plans and new generation connections, EirGrid and the System Operator for Northern Ireland (SONI) are expecting increased fault levels with high DC time constants in some areas of the all-island transmission grid. PSC provided guidance on industry best practice and a recommended method to de-rate the circuit breaker AC component accordingly.

Challenge

EirGrid and SONI wanted to investigate methods for assessing the asymmetrical breaking duty in HV circuit breakers exposed to DC time constants higher than the IEC 62271-100 standard test parameters and to develop an accurate and practical methodology to de-rate the AC component, if appropriate, in a cost-effective manner. This methodology should reflect international best practice and must not compromise safety as far as reasonably practicable.

Solution

PSC initially reviewed and discussed the published literature relating to international standards, technical recommendation and international best practice with regards to de rating of circuit breakers. PSC then developed a methodology to calculate de-rating factors using an accurate and simplified method for calculating major loop area. The basis of the methodology is the comparison of the energy under that area for the DC time constant at which the circuit breaker (CB) was tested and the DC time constant of the system short-circuit current the CB is required to interrupt. A comparison of de-rating factors calculated by the different published methods including for constant arc voltage and constant arc resistance was presented to compare the strengths and weaknesses of each method. PSC recommended the CB de-rating method to be adopted as the preferred option by EirGrid and SONI and performed calculations for various 3-phase short-circuit fault scenarios.

Results

PSC presented an assessment of a range of accurate and practical methods for investigating asymmetrical breaking duty and de-rating circuit breakers which proposed a cost-effective methodology. A recommendation was also given to EirGrid and SONI to adopt a special case DC time-constant and accept a specific limit on the major current loop length for new switchgear to be installed in areas of the all-island transmission system with high DC time constants.

PSC WELCOMES NEW STAFF

TIM RITCHIE

PSC would like to formally welcome Tim Ritchie, who joins the leadership team as Chief Revenue Officer. In this role, Tim has global responsibility for marketing and sales. Tim has thirty years of commercial experience including responsibility for marketing and sales in a variety of industries ranging from civil engineering to the Internet of Things. Tim is passionate about training and leading teams to grow through a strong focus on client needs, believing that the key to a strong business is serving clients and staff to the best of our ability. We couldn't be happier to have you on the team Tim!

KEVIN LONG

PSC is pleased to welcome Kevin Long to PSC Australia. Kevin is a Control Systems Engineer with more than 8 years' experience in various operational and project roles, including strategic planning, project controls, stakeholder management and leadership. He has experience in control systems design for the Power, Mining, Oil & Gas, Chemical, LNG Supply Chain and Iron & Steel industries. Kevin has built a solid reputation for successfully leading and delivering numerous projects in real-time operational/production environments.

NOEL ILOCTO

PSC is pleased to welcome Noel Ilocto who joined PSC earlier this year as a Network Engineer. He has more than 18 years of experience in the telecommunications industry. Before joining PSC, Noel was a Network Engineer for Optus in its Network Operations Centre in New South Wales, with responsibilities that included ensuring optimal service levels and technical troubleshooting. Noel will be providing valuable services including the design and implementation of SCADA telecommunications networks and other projects including MPLS.

PSC Supports Rwanda Girls Initiative

On May 18th, PSC sponsored a 5k fun run in support of the Rwanda Girls Initiative on their mission to educate and empower girls of Rwanda to reach their highest potential. The run, organized by a 9th grade student of the Overlake School in Redmond, WA, took place at Medina Park in Medina, WA near PSC's North American headquarters. PSC's Alex Boyd and Tom Addison participated in the event.

You can learn more about the Rwanda Girls Initiative and their mission at https://www.rwandagirlsinitiative.org/

PSC CEO Alex Boyd (L), Katharine Holdsworth (C), Tom Addison (R)

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