Power System Protection & Design Conference

Renewable Energy, Microgrids, IEC 61850, Electrical Safety

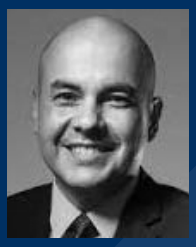
6th & 7th October 2021

Crowne Plaza - Melbourne Australia

Your Keynote Speakers

Professor Akhtar Kalam

- Discipline Group Leader of Electrical Engineering at Victoria University
- Lecturer at the Engineering Institute of Technology (EIT)
- PhD, Electrical Engineering at University of Bath



Raúl Barrera

- Lead Engineer / HA & HV Auditor | Voltex Power Engineers
- Chief Executive Officer | Power & Plant Training Pty Ltd RTO40627
- Over 29 years international experience
- 11 years as an accredited Hazardous Area, High Voltage and Safety Management System Auditor in Australia

What You Will Gain From Attending?

- Find practical solutions to your power system protection design and installations issues
- Discuss and review technical challenges in micro grid installations
- Update your knowledge of power system protection and electrical design
- Learn about protection complexities in the electrical rail network
- Understand the benefits of Battery Energy Storage Systems (BESS)
- Discuss compliance to standards with experienced electrical engineers
- See how optimal protection design can improve production and reduce costs
- Understand the philosophy of control for power system frequency dynamics
- Learn about new methods for monitoring distribution networks including 'island-able' microgrids.
- Hear relevant local case studies from the Australian electrical industry
- Network with specialists in the field and your peers
- No sales pitches – non commercial presentations

Who Should Attend?

- Network, protection and distribution engineers and technicians
- Generation, transmission engineers and technicians
- Electrical engineers, technicians and electricians
- Substation engineers and technicians
- Maintenance engineers and asset managers
- Plant, project and design engineers
- Industrial organisations with HV electrical distribution
- Engineering and safety managers
- Renewable energy specialists
- Government safety regulators/inspectors

And all other engineering professionals who have an interest in power system protection and design. .

Discounts

Early Bird Offer!
10% Off

10% off the conference fee for registrations received on or before the 8th September 2021

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Introduction to Power System Protection & Design

A Power System Protection System has three main functions or duties:

- Safety - Ensure safety of personnel.
- Reliability - Safeguard the entire system to maintain continuity of supply.
- Maintenance - Minimise damage and repair costs where it senses a fault.

These requirements are necessary, firstly for early detection and localisation of faults and secondly, prompt removal of faulty equipment from service. In order to carry out the above duties, protection must have the following qualities:

Selectivity, Stability, Sensitivity and Speed. To meet all of these requirements, protection must be reliable which means it must be dependable and secure.

This conference will cover power system protection design, installation, testing and inspection procedures for industrial and commercial power systems with a strong focus on renewable energy and integration, microgrids, electrical safety and substation automation.

This event will explore these electrical topics from a fresh yet practical perspective to help delegates reduce expensive downtime in their plant and/or equipment by identifying the correct application of these principles.

Conference Program – Day One

6th October 2021

8:00am – Registrations Open

8:25am – Opening Address

8:30am – Session 1

KEY NOTE

Renewables and Alternatives Implementation and the Associated Technical Issues

Professor Akhtar Kalam – Discipline Group Leader of Electrical Engineering, Victoria University

Microgrids are becoming increasingly attractive to consumers and as such in the future, a great number of them will be installed at consumer's sites. In this situation, conventional distribution networks that accept distributed generation connections may face serious difficulty when its control and protection functions become more complicated. This incurs a burden to the network operation and some technical limitations will appear when a great number of distributed generations are installed. One way of overcoming such problems, a micro grid system is formed to provide reliable electricity and heat delivering services by connecting distributed generations and loads together within a small area. A microgrid is usually connected to an electrical distribution network in an autonomous way and employs various distributed generation technologies such as micro-turbine, fuel cell, photovoltaic system together with energy storage devices such as battery, condenser and flywheel. Micro grids can cause several technical problems in its operation and control when operated as autonomous systems. This presentation will review technical challenges on micro grid and embedded generation on the network.

9:30am – Session 2

Enhanced Switchboard Maintenance using IoT Technology

Mina Shehata – Managing Director, RMS Manufacturing

In a connected world where everything is delivered to us in a heartbeat we seem to take electrical installations for granted and thinking they will run forever without the correct maintenance and servicing they require. Through IoT technology we can get notifications on issues from circuit breakers tripping to overheating of circuit breakers and being able to mitigate a fire through a series of alarms that will shut down the switchboard and reduce the initiation of a fire. Electrical fires occur due to lack of maintenance and servicing of equipment. If we can mitigate the risk then buildings, assets and production can run without interruption.

10:15am – Morning Tea

10:45am – Session 3

How to leverage FCAS from a VPP without a market and can PV contribute to operating reserves?

Thomas Wearne – Alice Springs Future Grid Project Lead, Power and Water Corporation

FCAS markets can provide an efficient means to procure Essential System Services but how can this be managed in smaller networks where a competitive market is unjustified? How do you give DER the opportunity to participate more while maintaining performance standards? Does this access compromise your goals of dealing with falling minimum demand? Is dynamic export just about hosting capacity or could it enable PV to contribute to operating reserves? These are the problems we are tackling in Alice Springs, with a population of under 30,000 people.

11:30am – Session 4

Protection performance challenges with increasing levels of inverter based generation

Peter Mangan – Managing Director, Applied Power Technologies

Increasing penetration of inverter based renewable energy sources on power systems introduces challenges for maintaining protection security and reliability. Traditional design and grading methodologies may need to give way to new paradigms to effectively address emerging engineering requirements. The fault current contributions from Inverter-based generation, particularly Type IV with full-power conversion and regulated with PID based control systems in their inverters and Power Plant Controllers (PPC), differ from those of synchronous based machines. So also does their ability to maintain system strength in the absence of physical inertia. Electrical centres and fault current distributions are impacted by new installations and affect the response of protection systems. This paper considers the modelling and analysis requirements emerging from the transition to renewable energy sources. It considers the modelling of inverter sources in steady state fault analysis tools and Integrated Protection Planning environments to capture the protection system response to system dynamic behaviour following fault clearance. Finally, it considers the growing need for regular comprehensive but efficient protection performance reviews. Such reviews ensure secure and reliable operation is maintained on the dynamically changing power systems operated today.

12:15pm – Lunch

1:15pm – Session 5

Arc Flash Hazards and Mitigation Using Protection Solutions

Talha Khalid - Project Engineer II – Protection, Schweitzer Engineering Laboratories (SEL)

An arc flash event is a dangerous release of energy caused by an electric arc due to an insufficient failure between live conductors. The safety is threatened by serious arc flash events if fault is not cleared quickly. In my presentation I will focus on the Arc Flash hazards, risks associated with it, some examples from the real time showing the damage caused by arc flash event. I will then discuss how we can mitigate it using modern protection devices by presenting some slides of arc flash protection application that uses the light sensors in conjunction with very high speed overcurrent element to detect arc flash event and fast operation of circuit breaker reducing the trip time in medium voltage switchgear. In the end I will present one fault report to analyse the arc flash protection operation allowing high speed tripping to reduce the damage

2:00pm – Session 6

Frequency and Power Dynamics, the Pathway to an Orderly Energy Transition

Kate Summers – Technical Executive, Power Operations (WSP)

There is an urgent need to understand the philosophy of control for power system frequency dynamics. Market control methods have overtaken engineered system controls and as more renewable energy is connected to the power system it is critical to adopt a suitable control philosophy. An examination of the changes made over time on behalf of the market exposes critical flaws in the current control strategy within the NEM. Engineered controls for the power system have been altered or removed creating unintended consequences and this impedes the ability to create an orderly transition to a low/no emission power system. This presentation will outline the problem, the effort involved in recovery and propose possible future control methods for an orderly transition.

2:45pm – Afternoon Tea

3:15pm – Session 7

Substation-Based Fault Location Technology for Power Distribution Networks

Dr. Reza Razzaghi – Lecturer, Monash University

Electricity distribution companies always seek fast, accurate fault location procedures to minimise the duration of interruptions. The most widely used fault location method used is based on Fault Indicators(FI), installed at numerous points along power lines, indicating when a fault is downstream. Then, the maintenance crew visually inspects the line between the indicated FIs to identify the exact fault location. Drawbacks of FIs are that many devices are needed (one FI per a few kilometres), they only simply show the presence of a fault downstream rather than the exact location and the process can take hours leading to very long outages.

Recently Monash University have developed a promising technology that is able to find the accurate fault location in complex power networks using a single measurement point. In contrast to state-of-the-art fault location technologies, this method requires very limited number of measurement points for complex networks, does not need time synchronised measurements and is robust against errors in measurement, fault impedance, and network topology. Dr Razzaghi will discuss a promising 2018 pilot test that was performed on a live medium voltage distribution feeder in Switzerland. The prototype correctly identified the fault location (with a resolution of 100 metres) in less than 3 minutes..

4:00pm – Dicussion Panel / Q&A

In this session we will invite all our conference speakers to the front of the room to form a technical panel. Delegates with the opportunity to ask our speakers questions and discuss protection related issues in their workplace, covering typical problems and possible solutions.

4:45pm – Day One Closing

5:00pm–6:00pm – Networking Drinks Session

Conference Program – Day Two

7th October 2021

8:30am – Session 9 KEY NOTE

Case study: Mina de Cobre Panama Integration of IEC61850 in protection systems

Raúl Barrera - Lead Engineer, Voltex Power Engineers. CEO, Power & Plant Training Pty Ltd

Automation and power system protection are not often mentioned together, at least not until recently, with the availability of economical technology and departure from proprietary communication protocols; integration of power system automation and protection is economical and technically feasible. Traditional SCADA, data collection and protection fast communication via the information exchange service called Generic Object-Oriented Substation Event or GOOSE. An object-oriented protocol designed to work over ethernet, IEC61850 offers advanced tools for control automation, protection bringing new capabilities and flexibility to power systems, as well as its own new set of issues. This case study explores the (very) large integration of IEC61850 and its challenges at First Quantum Minerals Mina de Cobre (Copper Mine) in Panama. The whole mining project encompasses the open pit copper mine, processing plant, port and power station.

9:30am – Session 10

Designing a DERMS – The role and limits of forecasting and dynamic export

Thomas Wearne – Alice Springs Future Grid Project Lead, Power and Water Corporation

DER aggregation can give you visibility of embedded generation and forecasting can tell you what is likely to happen next but there is never 100% certainty. Is P10 and P90 good enough for operational decision making? Do we accept that not all clouds can be forecast? Should this be considered a contingency event? This situation gets even more complex with dynamic export where we can change projected futures and therefore must forecast alternate scenarios. This talk considers some philosophical aspects of DERMS design, operation and integration.

10:15am - Morning Tea

10:45am – Session 11

Thermal Energy - Smart Distribution in Districts and Buildings

Erwin Boermans – Founding Director, COMFORTiD

Heat can be made in many ways. Historically the industrial waste-heat from fossil-fuel burning power stations has been one of those. Are we using thermal energy and CO_2 wisely in our local communities? Carbon-dioxide and various temperature-levels of waste-heat are available in different locations and times around Australia. Recognising this and enabling local usage can enable local communities to prosper.

How does this relate to power system design? Australia is facing real infrastructure-collapse and alternative energies must be considered. Refrigeration is the most impactful to fix climate change with smart urban designs and thermal energy distribution for heating and cooling to save our precious water. Erwin will discuss thermal options for Australia including energy distribution design in districts, buildings (air/water) and implementation. Global case studies from the Netherlands, Switzerland, Sweden and Denmark will be explored.

11:30am – Session 12

Voltage, Stability and Islanding Control in Microgrids

Phil Kreveld – Author and Industry Electrical Specialist, Electrical Connection

Distribution engineering is influenced by the increasing penetration of distributed generation and therefore requires new design concepts in the provision of voltage control, frequency stability, controlled islanding and protection engineering. New methods for monitoring combined with supervisory and control tools will be presented that are appropriate to distribution networks including 'island-able' microgrids. Voltage control at individual consumption points, series and parallel voltage control in networks influenced by reverse power flow and short-term latencies, based on continuous monitoring to grid edge will be discussed as well as its utilisation in relaying for protection engineering based on fault current limitations.

12:15pm - Lunch

1:15pm – Session 13

Protection Complexities in the Electrical Rail Network

Lilangie Jayasuriya - Secondary Systems Engineering Manager, Metro Trains Melbourne

As one of the oldest operating DC rail networks in the world, integrating new technology into the existing electrical infrastructure operated by Metro Trains Melbourne presents a number of challenges. My paper will present an overview of the MTM electrical network and the types of complexities the that the MTM Electrical Engineering group have encountered over the last 5 years in managing this interconnected network. It will also detail a range of protection related challenges the group as addressed including the introduction of REFCL, complexities in setting DC protection relays for overload but under fault levels and the introduction of UPS systems to support the signal power distribution network.

2:00pm – Session 14

Australia's First Large Scale PMU Deployment in the Medium Voltage Distribution Network

Martin Van Der Linde – General Manager - Marketing, NOJA Power

Synchrophasors and Phasor Measurement Units (PMU's) are not uncommon in transmission networks, but medium voltage distribution networks remain new ground for this technology. Prompted by emergent challenges in renewable integration and distributed generation connections into the medium voltage distribution grid, Australian switchgear manufacturer NOJA Power have embarked on a project in collaboration with the Australian Renewable Energy Agency, AEMO, Energy Queensland, AusNet Services, the University of Queensland and Deakin University for Australia's first utility scale deployment of PMU's on the medium voltage distribution system. This paper provides an overview of research findings from this project. Promising benefits in grid stability under high renewable energy penetration, network condition monitoring and fault location estimation are emergent themes from the research.

2:45pm - Afternoon Tea

3:15pm – Session 15

IEC 61850 Demonstration for Interoperability & GOOSE Messaging

Professor Akhtar Kalam – Discipline Group Leader of Electrical Engineering, Victoria University

Over the past decade, a great deal of importance has been given to the theoretical aspects of the IEC61850 protocol without any real practical demonstration of the standard in terms of multi-vendor interoperability. This lack of acceptability has resulted in many electrical utility engineers who deal with a number of costly Intelligent Electronic Devices (IEDs) having second thoughts about the IEC61850 implementation in substation environments. These electrical utility engineers lack the confidence as they have not been exposed to training modules that can help educate themselves and future engineers. The authors of this paper aim to revolutionize this outlook by building an industry first IEC61850 portable testing unit capable of multi-vendor interoperability. The testing unit comprises of a SEL-311L Line Current Differential Protection and Automation Relay, SEL-487E Transformer Differential Relay, REF615 Feeder Protection and Control Relay, P145 Feeder Management Relay, SEL-2407 Satellite-Synchronized Clock, SEL-2725 Unmanaged Ethernet Switch and a RSG2200 9-Port Managed Gigabit Ethernet Backbone Switch. The authors will present all necessary wiring diagrams and processes essential to manufacture and establish the IEC61850 testing unit using Generic Object Oriented Substation Event (GOOSE) messaging. OMICRON's CMC256 test set will be used to capture, configure, map and simulate all IEDs. The IEC61850 testing unit (developed by Victoria University) will be presented.

4:00pm - Dicussion Panel / Q&A

In this session we will invite all our conference speakers to the front of the room to form a technical panel. Delegates with the opportunity to ask our speakers questions and discuss protection related issues in their workplace, covering typical problems and possible solutions.

4:30pm – Closing

About the Keynote Presenters

Professor Akhtar Kalam

Professor Akhtar Kalam has been at Victoria University in Melbourne since 1985 and was formerly Deputy Dean of the Faculty of Health, Engineering and Science for 7 years. He is currently the Head of External Engagement in the College of Engineering and Science. He is also the Editor in Chief of the Australian Journal of Electrical and Electronic Engineering. More than 40 PhD students have graduated under his supervision.

He received his B.Sc. and B.Sc. Engineering from Calcutta University and Aligarh Muslim University, India in 1969 and 1973 respectively. He completed his MS and Ph.D. at the University of Oklahoma, USA and the University of Bath, UK in 1975 and 1981 respectively. He has worked with Ingersoll Rand and other electrical manufacturers.

He is regularly invited to deliver lectures, work on industrial projects and examine external thesis overseas. He regularly offers CPD and Master Class courses on Power System Protection, Renewable Energy, IEC 61850, Cogeneration & Gas Turbine Operation and PBL in engineering education to practicing engineers, the Energy Supply Association of Australia (ESAA) and Australian Power Institute (API).

He also runs postgraduate distance education program on Power System Protection for the ESAA. He has conducted research, provided industrial consultancy and published over four hundred and seventy publications on his area of expertise and written over 29 books. He provides consultancy for major electrical utilities, manufacturers and other industry bodies in his field of expertise. Professor Kalam is a Fellow of EA, IET, AIE, a member of IEEE and CIGRE AP B5.

Raúl Barrera

Raúl, performing the role of Lead Engineer and Auditor for the Voltex Group, is a Chartered professional engineer; and holds a Master of Engineering Practice, specialising in Power Systems Engineering. His career spans more than 29 years internationally and 11 years as an accredited Hazardous Area, High Voltage and Safety Management System Auditor in Australia.

As a qualified and accomplished trainer, holding a Vocational Diploma of Management has delivered technical training for the last 7 years.

Raúl's LinkedIn Profile: linkedin.com/in/raul-barrera-1a2b6520

General Information

Confirmation Details

A confirmation email and invoice will be sent to delegates within 3 days of receiving the registration.

Cancellation Policy

A 20% cancellation fee will apply for cancellations received 7–14 days prior to the start date of the conference. Cancellations received less than 7 days prior to the start date of the conference are not refundable, however substitutes are welcome.

Venue

Crowne Plaza Melbourne
1/5 Spencer St, Melbourne VIC 3008 AUSTRALIA
Phone: (03) 8899 6726

Accommodation

Please book directly through the Crowne Plaza reservations team on (03) 8899 6726
or email reservations@melfs@ihg.com.

Food and Beverages

All lunches, morning and afternoon refreshments are included in your delegate registration. Please send any dietary requirements through to emma.cameron@idc-online.com

Unable to Attend

If you are unable to attend the full conference program, contact us for details to attend individual sessions or to purchase the Conference Resource Kit.

Registration Form

To register, simply complete the registration form below and submit via email to conferences@idc-online.com or you can register online at www.events.idc-online.com

01 Delegate Details

Contact: ..... Company Name: .....

Company Address: .....

Suburb: ..... State: ..... Postcode: ..... Phone: .....

Admin/Accounts Payable Email: .....

Attendees

1: ☐ Mr ☐ Mrs ☐ Ms Name: ..... Job Title: .....
Email: .....

2: ☐ Mr ☐ Mrs ☐ Ms Name: ..... Job Title: .....
Email: .....

3: ☐ Mr ☐ Mrs ☐ Ms Name: ..... Job Title: .....
Email: .....

4: ☐ Mr ☐ Mrs ☐ Ms Name: ..... Job Title: .....
Email: .....

02 How Did You Hear About This Event?

☐ Received an email from IDC ☐ Searched online (Google, Yahoo etc) ☐ Recommended by a friend/colleague

☐ Magazine advertisement/insert ☐ Other (please specify): .....

03 Registration & Payment Details (NB: prices shown are inclusive of GST)

Power System Protection & Design Conference 6th & 7th October 2021

Total

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$1,615.50 x ..... delegates = $ ..... $ .....

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