Power System Protection & Design Conference

Renewable Energy, Microgrids, IEC 61850, Electrical Safety

6th & 7th October 2021

Mantra on Russell - 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

Barrie Moor

- Principal Engineer at Power System Protection Training
- 40 years experience in the Queensland Electricity Transmission Supply Industry
- Power System Protection and Design Specialist

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

Protection: The Conflicting Requirements of Dependability and Security

Barrie Moor – Principal Engineer, Power System Protection Training

A dependable protection system will trip reliably and clear power system faults, thus optimizing safety, security and stability of the power system. A secure protection system will never trip inadvertently, thus avoiding unnecessary outages, loss of supply and degradation of quality of supply to customers. However, these two mandatory and critical requirements are conflicting. This presentation will consider both requirements, and consider the implementation of unit, non-unit and back-up protection schemes in our quest for optimal performance of the power system protection system.

10:15am – Morning Tea

10:45am - Session 3

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.

11:30am - Session 4

Virtual Power Plants & Generator Connection Requirements

Thomas Wearne – Electrical Engineer - Electrical Power & Renewable Energy, GHD

What happens when a VPP as an aggregate becomes large enough to be considered a registered generator? In the NT, a developer is determining this in the pursuit of gaining an export licence for their behind-the-meter commercial solar systems. This talk will explore the ever-increasing challenges of attaining grid connections in the renewables era and how these are giving rise to a new trend of small solar farms. The talk will also consider if VPP programs could be mandatory for behind-the-meter solar in the future.

12:15pm – Lunch

1:15pm – Session 5

Utility BESS System Protection and Integration

Alamdar Syed – Lead Electrical Engineer, Dexterous Electrotechnologists

The current shift of energy to renewable resources is at its fastest track. Regardless of the scale, it is common that the supply of major resources such as solar or wind, is not consistent. To fill the gap, there is need for storage, and Li-ion batteries are a common solution. Though there are some debates about the safety and scale manufacturing of these batteries, if planned smartly this can be overcome. One of the best ways to use these batteries is with Battery Energy Storage Systems (BESS). In this presentation Alamdar will explore utility level BESS including its equipment and critical protection requirements as well as cover grid integration of BESS and the parameters that need to be considered.

2:00pm – Session 6

Impact of REFCL (Bushfire Mitigation Technology) on HV Customers

Abrar Aziz - Electrical Engineer, Middleton Group

Eric Bendtsen – Power Engineer, Middleton Group

Large sections of the Victorian electrical distribution network are located in areas of extreme bushfire risk. This requires much consideration and investment to mitigate bushfire risk. The Victorian government established the Powerline Bushfire Safety Program to develop and implement bushfire risk mitigation measures. One such measure is the deployment of a Restricted Earth Fault Current Limiters (REFCLs). A REFCL is a protective device that mitigates grass and bushfire ignition through limiting fault current energy following a powerline coming into contact with earth, typically as a result of a fallen powerline. The REFCL device will be installed in the zone substation and will be owned and operated by the power utility. This device, when it operates, will impose a higher phase to earth voltages on all equipment connected to the REFCL protected high voltage (HV) circuit. This includes customers that take supply at HV. All High Voltage (HV) assets, including those owned by HV customers, connected to a REFCL network must withstand up to 24.2kV Phase to Earth for a duration specified by the utilities. The HV customer are required to ensure all their assets are able to withstand the elevated voltages or install an isolation transformer before their point of connection which effectively isolates the plant from the overvoltage effects of REFCL. This talk reviews the options for HV customers highlighting the commercial and technical risks which allow them to undertake an informed decision for ensuring their site to be REFCL ready.

2:45pm – Afternoon Tea

3:15pm – Session 7

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.

4:00pm – Session 8

Frequency Dynamics, the Pathway to an Orderly Energy Transition

Kate Summers – Technical Executive, Power Operations (WSP)

Shri Ramaprasad – Power System Engineer (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 existing problem and examine possible future control methods for an orderly transition.

4:45pm – Day One Closing

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

Sponsorship Opportunities

Representing your business at the Power System Protection & Design Conference in 2021 will provide you the opportunity to reach key decision makers from a multitude of industries. For more information on sponsorship and exhibition opportunities please contact:

Sarah Montgomery at: conferences@idc-online.com or call 1300 138 522

8:30am – Session 9

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 CO2 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.

9:15am – Session 10

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.

Morning Tea from 10:00am – 10:30am

10:30am – Session 11

Microgrids: The Regulation of Operating in an Islanded State

Thomas Wearne - Electrical Engineer - Electrical Power & Renewable Energy, GHD

It is common for small private facilities to sub-meter their power from larger entities such as universities or shopping centres. In this situation, the electricity utility is still responsible for the power quality to both parties, but would this be the case if the larger entity were providing power as an islanded microgrid? What if the islanding was voluntary and not in response to a grid outage? This talk considers the shifting of responsibility that might occur in these situations and some of the circumstances where islanding might be desirable for both the utility and the microgrid owner.

11:15am – Session 12

Transformer Biased Differential Protection: Current Transformer Connection Requirements

Barrie Moor – Principal Engineer, Power System Protection Training

The popular concept is that, when implementing transformer biased differential protection, the current transformer (CT) connections must correct for the transformer phase shift. To do this, we thus connect the CTs so as to be opposite to the transformer connections. That is, we simply select CT connections to be star on the delta side of the transformer, and delta on the star side. Certainly, this will correct the vector change across the transformer, but that is only half of the problem. Zero sequence, or neutral current, correction is also required. This discussion will consider how we can achieve both, either with actual CT connections, or via microprocessor based relay algorithms. Which delta connection do we select? D1 or D11?... or something else? How do we get it right first time, every time?

12:00pm - Lunch

1:00pm - Session 13

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.

1:45pm - Session 14 – CASE STUDY

Protection Complexities in the Electrical Rail Network

Lilangie Jayasuriya - Senior Substation Engineer, 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 a range of protection related problems that the Electrical Substations group of MTM have encountered over the last 5 years including the introduction of REFCL, the introduction of rectifier thermal monitoring, complexities in setting DC protection for overload but under fault levels, the introduction of Voltage Limiting Devices to ensure a safe working environment and grading within internal 22kV networks tied between bulk feeder supplies from distribution zone substations.

2:30pm - Afternoon Tea

3:00pm - 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.

3:45pm - Session 16

Discussion Panel

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.

Barrie Moor

With over 40 years experience in the Queensland electricity transmission industry, Barrie Moor has been involved in the design, coordination and implementation of protection schemes associated with Queensland's HV and EHV transmission systems since 1981. Barrie also has extensive experience with the protection of large generating plants. From 2000 to 2007, Barrie filled the role of Senior Engineer Protection Design, with statewide responsibility, leading Powerlink's Protection Design Team. From 2007 to 2012, in the role of Principal Consultant Substation Protection, and then Principal Engineer-Investigations, Barrie provided specialist Protection Design and Fault Analysis services to support the Asset Management and Operational Groups within Powerlink.

Barrie has 20 years experience within Australia and internationally in the provision of university post graduate training on the design and implementation of HV and EHV Transmission Protection Systems. He has presented a number of papers on specialised aspects of protection design at conferences both within Australia and internationally. Barrie has also represented Powerlink on CIGRE committee APB5, Power System Protection and Automation and has served as a corresponding member of Cigre and also IEE working groups on Protection Systems.

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

Mantra on Russell
222 Russell St, Melbourne VIC 3000 AUSTRALIA
Phone: (03) 9915 2500

Accommodation

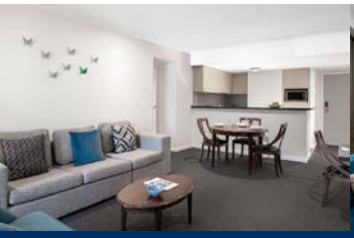
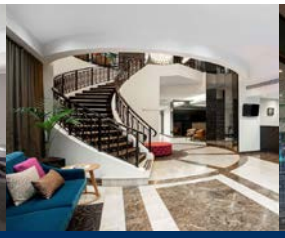
The conference venue has accommodation available. Please book through their reservations team on (03) 9915 2500 or russell.res@mantra.com.au.

Food and Beverages

All lunches, morning and afternoon refreshments are included in your delegate registration.

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.



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

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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 29th & 30th September 2021

Total

☐ OPTION 1: **Early Bird Discount** 10% OFF – Book on or before 8th September (SAVE $179.50)
$1,615.50 x ..... delegates = $ ..... $ .....

☐ OPTION 2: **Standard Rate** (No Early Bird) – Book after 8th September
$1,795.00 x ..... delegates = $ ..... $ .....

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3 x delegates = 2 x $1,615.50 = $3,231.00 $ .....

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