

*A 2-Day Professional Development Seminar on*

# Fundamentals of Transmission & Distribution Circuit Breakers



Organised By :



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This course will give an overview of the High Voltage and Medium Voltage circuit breakers technologies and applications.

On completion of this course the attendees should have a good understanding of:

- The principles of current interruption
- How a circuit breaker works
- Circuit breaker technology
- Switching duties and the influence of network conditions
- Tools to analyse the reasons of circuit breaker failures and to select appropriate risk mitigation techniques to avoid these failures.
- Circuit breaker ratings and applicable standards: It is not the aim to discuss in detail the standards but to explain the concepts which are the bases of the standards.
- How to verify that the circuit breaker will perform its duty.

### WHO SHOULD ATTEND

The two-day seminar is intended for engineers, managers, technical officers and any others involved in work dealing with circuit breakers and those who wish to obtain a better understanding of the functions of circuit breakers. System studies and planning engineers, specification and procurement engineers, protection and control engineers, commissioning engineers and asset managers who work for the following organizations should attend this seminar:

- ◇ **Power generation, transmission and distribution companies**
- ◇ **Oil and gas companies**
- ◇ **Engineering consultants**
- ◇ **Large industrial companies e.g. Mining, petrochemical, steel, manufacturing**
- ◇ **Electrical contractors**

1. Principles of Current Interruption
  - Alternating Current interruption
  - Electric arc
  - Thermal and Dielectric failures
  - Electrical Insulation
  - Electro-Magnetic forces
2. Interrupter Technology
  - Circuit Breaker History
  - Oil Interrupters
  - Air Interrupters
  - Gas Interrupters
  - Vacuum Interrupters
  - Driving Mechanisms
3. Switching Transients
  - Surge Propagation
  - Transient Recovery Voltage (TRV)
  - Fault Current Asymmetry
  - First-Pole-to Clear factor
4. Fault Current Interruption
  - Terminal Faults
  - Short-Line Faults
  - Severe TRV condition: series reactor limited faults
5. Inductive Switching: Switching of Transformers and Reactors

## About the Course Leader

6. Capacitive Switching: Switching of Capacitor Banks
7. EHV Transmission Line Switching
8. Surge Mitigation Techniques and Control Switching
9. Circuit Breaker testing and Specification
  - Type Tests and Routine tests
  - International standards
  - Temperature-rise tests
  - Mechanical endurance and climatic test
  - High Voltage Testing
  - Short-Circuit Testing
  - Internal arc withstand tests
10. Summary and General Discussion

### CUSTOMISED IN-HOUSE COURSE AVAILABLE

This program can be customised to suit specific needs of your organisation at significant savings.

Please contact us on (02) 8448 2078 or email [Enquiry@cpdint.com.au](mailto:Enquiry@cpdint.com.au) for more details.

Visit [www.cpdint.com.au](http://www.cpdint.com.au) for more courses.



**Dr. Jose Lopez-Roldan** received his M.Sc. and Ph.D. degrees in Electrical Engineering from the University of Barcelona in 1993 and 1997 respectively. During his PhD studies he was visiting-researcher at the R&D centres of Ontario-Hydro (Toronto), Schneider-Electric (Grenoble) and EDF (Paris) where he did research on Electrical Insulation of High Voltage Switchgear.

He worked at VA TECH-Reyrolle in the UK from 1996 to 2000 as a senior engineer engaged in the development of Gas Insulated Switchgear. He joined Pauwels in Belgium in 2000 as R&D project manager in the Transformer division and from 2002 to 2006 as engineering manager of the Projects division, responsible of the engineering of substations. He moved to Australia in 2006 to work for Powerlink Queensland, where he works as Principal Consultant in Gas Insulated Switchgear. He is responsible of a wide range of technical investigations on switchgear and he develops innovative techniques for condition monitoring of HV plant.

Jose has co-authored 35 papers in High Voltage Switchgear, Substations and Electrical Insulation. He is a Fellow of the Institute of Engineers of Australia (IEAUST) and senior member of the IEEE. He has been in several international working groups of the CIGRE where he is currently a member of WG D1.03 and A3.24. He is lecturing in circuit breakers and switchgear at the Queensland University of Technology in Brisbane.