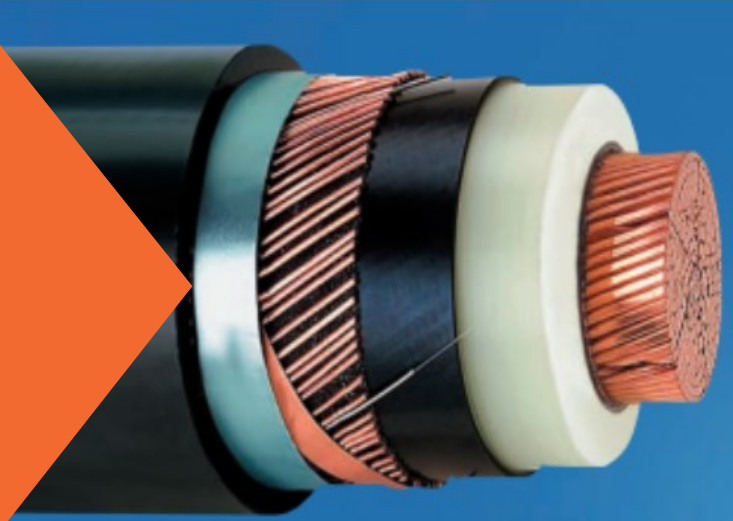


POWER SYSTEM ENGINEERING
ONLINE SEMINAR SERIES

LIVE+REAL TIME+INTERACTIVE



UNDERGROUND POWER CABLE SYSTEMS & ENGINEERING

Professional Development Online Seminar

Date | Time : 8-9 June 2023 | 10am-6pm AEST (Sydney Time)

Venue : ([Live Streamed via ZOOM](#))

by **Malcolm Davies**, *MEngSc, MIEAust, CPEng, RPEQ, NPER*



Your True Partner in Attaining
Professional Excellence

Seminar Overview

Underground transmission and distribution cables systems have lately experienced a renewed interest by the network service providers, industry and developers. Underground power cable systems are now being implemented as the preferred medium to transmit energy over reasonably long distances, specifically with the huge increase in renewables such as solar and wind farms at medium voltage levels.

This seminar covers review of the basics and later engages in the review of designs that provide lowest cost and highest reliability systems, methodologies of upgrading existing cable systems with a look at design to identify and correct any issues that may lead to pre-mature failures.

A brief review of the various methodology used in designing and installation of such as the Neher and M.H. McGrath methodology, have now been refined by the IEC with and its development of IEC 60287 and related ampacity standards. Other Australian Standards such as AS/NZS 3008 - HV Cables, and AS/NZS 5033 - for PV Array DC Cabling are referred in this seminar.

This seminar covers the basic technical concepts related to underground power cable systems including:

- ◆ Overview of cable types, components, construction and accessories
- ◆ Soils and backfill characteristics, thermal and soil resistivity influence
- ◆ Underground cable system design including:
 - cable and trench configurations
 - soils and backfill and its effects on ampacity
- ◆ System constraints on cable ratings
 - multiple cable loading
 - temperature
 - Installation configuration and influence of laying conditions on ampacity
 - operation and maintenance
 - sheath bonding effects
 - increasing efficiencies
- ◆ Installation methodologies
- ◆ Condition monitoring and testing procedures

Seminar Leader' s Profile

Malcolm Davies, *MEngSc, MIEAust, CPEng, RPEQ, NPER*

Malcolm is currently a Chief Technical Principal of SMEC (Snowy Mountains Engineering Corporation). He is recognised specialist in Substation Design and Earthing of Power Systems, both in Australia and internationally. He provides post-graduate professional development training on topics of power systems with specific reference to Substation Design.

With over 40 years working experience in the electricity transmission industry, Malcolm has personally investigated and managed the risks associated with substation design, cable design, installation, monitoring and testing. He has been involved in design and implementation of HV and LV cabling schemes associated with Australia' s electricity transmission and distribution networks. Malcolm has held various responsible positions in the Electrical Engineering discipline, consulting, design, project management, maintenance of power systems. He has a special interest in feasibility studies for network connections, cabling systems, system augmentations, detailed design, layout and refurbishments, primary, secondary and protection systems.

Malcolm has worked on projects for the power generation, transmission, distribution, traction, mining and heavy industries in a variety of commercial project and design management roles, with primary responsibility for substation design, installation and commissioning. He has practical knowledge from LV to EHV, renewable electrical power and switchgear systems, and with extensive experience in electrical substation design, protection systems, HV cabling designs, transformers, NER/X 's, capacitor banks and reactors, PLC 's, frequency drives and large motor control systems.

Malcolm is a Member of the Institute of Engineers Australia, a Chartered Professional Engineer, a Registered Professional Engineer of Queensland. He holds a Master of Engineering Science (Power Supply Engineering).



Seminar Contents

Day 1

Session 1

- ◇ Overview of Cable Types
 - Cable History and Cable types
 - Cable Components and Accessories
 - Cable and Conductor construction
 - Insulation types
 - Sheaths and Jackets

Session 2

- ◇ Ampacity and Principles
 - Methods of Determining Ampacity - (Neher/ McGrath, AS 3008, IEC 60287)
 - Cable Sheath Bonding / System Grounding
 - Thermal Resistance
 - Soil Characteristics
 - External Influences
 - Mutual Heating
 - Normal, Cyclic and Emergency ratings
 - Short circuit ratings
 - Soil and Backfill Characteristics and Effects on Ampacity

What You Will Learn?

Attendees will gain an understanding of :

- ◆ Principles of cable design and accessories, methods and information on:
 - planning, design and installation of underground cable circuits.
 - cable system types, available design tools, cable accessories and configurations.
 - all aspects of underground transmission systems, from the initial planning through design optimization to final operation and maintenance.
 - system constraints on cable ratings
 - overview of cable testing and monitoring
- ◆ Important considerations and requirements leading to the calculation of ampacities (or ratings) of underground power cable systems.

Day 2

Session 3

- ◇ Cable System Design
 - Installation Design
 - Continuous Ratings, Cyclic and Emergency Ratings
 - Sheath Voltages
 - Cable Crossings
 - EMF influence

Session 4

- ◇ System Constraints on Ratings
 - Multiple Cable Loading
 - Soil and Backfill Characteristics
 - Temperature
 - Installation Configuration and Influence of laying conditions on ampacity
 - Operation and Maintenance
 - Sheath Bonding Effects
 - Increasing Efficiencies
- ◇ Accessories and Condition Monitoring
 - Link Boxes, SVL's, Connector Terminations
 - Installation methodologies
 - Distributed Temperature Sensing (DTS) Maintenance
 - Manufacture and Testing
 - Fault Location

Who Should Attend ?

This course is designed for engineers and technical personnel who are wanting to expand their understanding of cabling, underground cable systems, the cable model and provide the engineer and technical personnel with the latest information on all aspects of underground transmission systems, starting from initial planning through design optimization through to final operation and maintenance.

No prerequisites are necessary, although a background in electrical, mechanical or civil engineering with a knowledge in cable sizing and calculation methodologies will assist in understanding the concepts.

Email your registration form to: register@cpdint.com.au

REGISTRATION FORM

3 WAYS TO REGISTER

Online : www.cpdint.com.au, or
 Call: 0450 387 277 (+61 450 387 277), or
 Email**: register@cpdint.com.au
 (** complete this registration form, scan and email to the above email address)

Please complete this section

Booking Contact (Mr/Mrs/Ms): _____		
Job Title: _____	Department: _____	
Email: _____	Telephone: _____	
Organization: _____		
Address _____		
State: _____	Postal Code _____	Country: _____

Please register the following delegate(s) for the online seminar:

1st Delegate Name (Mr/Mrs/Ms): _____

Job Title: _____

Department: _____

Email: _____

Telephone: _____

2nd Delegate Name (Mr/Mrs/Ms): _____

Job Title: _____

Department: _____

Email: _____

Telephone: _____

3rd Delegate Name (Mr/Mrs/Ms): _____

Job Title: _____

Department: _____

Email: _____

Telephone: _____

4th Delegate Name (Mr/Mrs/Ms): _____

Job Title: _____

Department: _____

Email: _____

Telephone: _____

(Please use another form if register more than 4 delegates)

PAYMENT METHODS

(please tick ✓ the relevant box to indicate your preferred method of payment)

EFT (Electronic Funds Transfer) , or

CREDIT CARD (VISA / MASTER / AMEX accepted)

REGISTRATION FEES AND DETAILS

2-Day Seminar	Super Early-Bird Fee (If payment & registrations are received by 6 April 2023)	Early-Bird Fee (If payment & registrations are received by 4 May 2023)	Standard Fee (per delegate)
Registration Fees (Excl. GST) :	AU\$1,280	AU\$1,330	AU\$1,380

GROUP DISCOUNTS

CPD International recognizes the value of learning in teams. Register **3** or **more delegates** and receive **5% off** current fee. Group Discount will compound on the top of your early-bird discount fees where applicable.

HOW TO PAY

Upon receipt of your booking, a tax invoice and registration confirmation email will be sent within 2 business days. Payment details will be sent together with the invoice based on your preferred payment method.

PAYMENT TERMS

All fee payment must be received prior to the event. Delegate(s) will be refused admission if payment is not received prior to the event.

CANCELLATIONS AND SUBSTITUTIONS

Once we have received your booking and payment, the place(s) are reserved. No refunds will be made for any cancellations, however, program credits of equivalent value only applicable for CPD International events will be provided. Credits can only be redeemed for 1 program and is valid for one (1) year from date of issue. One time substitution is allowed at no additional charge. Subsequent substitutions will be charged 10% admin fee. **Any cancellation or substitution must be made in writing with at least one week notice.**

NOTE:

- As training event organizer CPD International Pty Ltd reserves the right to make changes to the event date, speakers, contents and venue due to reasons beyond their control. In the unlikely event that the seminar is cancelled, CPD International will refund the full amount and disclaim any further liability..
- The views expressed by the speaker in the event are not necessarily those of CPD International Pty Ltd.

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