

EIT WORKSHOP



# Designing Low Voltage Installations With a Focus on Renewable Integration, Safety and Construction

30<sup>th</sup> & 31<sup>st</sup> March, 2023  
Crowne Plaza Adelaide  
South Australia

Presented by



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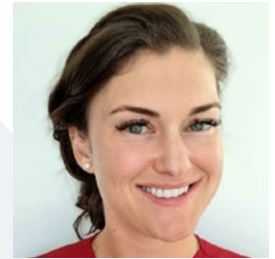
# Keynote Facilitator & Presenters

## Facilitator: Alex Gregory

Principal Engineer, AECOM | Lecturer, Engineering Institute of Technology (EIT)

Alex is a Principal Electrical Engineer and the Electrical Team Lead within AECOM Buildings & Places in Brisbane. She also lectures for the Engineering Institute of Technology (EIT).

Alex has extensive experience in the design and documentation of electrical services in defence and healthcare, and for industrial applications. She applies her strong technical knowledge and construction experience to the electrical engineering principals of low voltage design. Alex is a Chartered Engineer of Australia and Registered Professional Engineer of Queensland.



## Virtual Presenter: Dr Yuanyuan Fan

Course Coordinator & Lecturer (Electrical Engineering), EIT

Coming from an electrical background, Dr Fan has always attached significance to social and environmental impacts in her everyday work and research. She believes the future lies in the efficient utilization and management of renewable energy sources; where smart grids, which incorporate technologies such as green hydrogen production and usage, will become practical and cost-effective.

Dr Fan has extensive engineering teaching experience and her applied research has resulted in an array of publications covering power system analysis, machine-learning engineering practices, and education. For a sustainable energy future, she believes electrical engineers need to proactively broaden their knowledge and collaborate with data communication and automation engineers, data scientists, and policy makers. Yuanyuan has recently been accepted as a member of IEEE.



## Virtual Presenter: Mr Deepak Pais

Lecturer (Electrical), EIT

Deepak is a Chartered Professional Electrical Engineer and Fellow of the Institute of Engineers Australia. He has a wealth of experience in asset management and engineering within the electricity supply industry, in manufacturing firms, and in the education sector.

Deepak started his career in the mining industry as a Project Engineer looking after substation and distribution equipment construction and maintenance. He then worked in a marine and logistics firm in the Bahamas as a Maintenance and Commissioning Engineer. Following this, he worked in the automobile manufacturing sector as a Maintenance Engineer on power distribution and utility related systems.

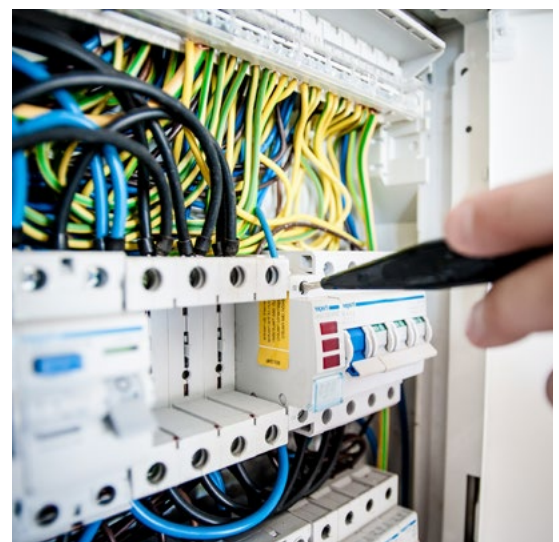
For the last 14 years, Deepak has been working as a senior engineer in asset engineering, risk and compliance for a leading NSW electricity distribution utility. Deepak is familiar with construction standards and has hands-on experience in design, maintenance of power distribution, and substation assets. He has a particular interest in industry best practice in asset management, on safety, reliability, quality, and on outcomes which are value for money.



## Overview

The workshop aims at providing an overview of the fundamentals of low voltage design, installation and electrical safety (including correctly sizing cables, protective devices and containment). This is complemented by presentations on renewable energy and arc flash integration. Each topic will cover the design steps, relevant Australian Standards, and provide insights into common design errors and considerations when conducting construction inspections.

This workshop is ideal for electrical engineers, contractors, managers, and services engineers in the construction industry looking to bridge their technical and practical knowledge.



# Day One | Thursday 30<sup>th</sup> March, 2023

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## 8:30<sup>am</sup> - 10:00<sup>am</sup> Topic One | Alex Gregory

### Introduction to AS/NZS 3000 Design

AS/NZS 3000:2018 is the golden rule book for electrical design within Australia. It is the standard to which all electrical engineers and contractors must comply during both design and installation. This topic outlines the legal requirements of electrical work within Australia and the responsibilities of designers. It also outlines the structure of AS/NZS 3000 standard and how best to navigate the various content.

- › Electrical safety laws
  - › Responsibilities of professional engineers
  - › AS/NZS 3000 overview
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## 10:00<sup>am</sup> - 10:30<sup>am</sup> Morning Tea

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## 10:30<sup>am</sup> - 12:00<sup>pm</sup> Topic Two | Alex Gregory

### Understanding the Electrical Design Process

An electrical design is often delivered in staged milestones, each requiring a different level of detail. This topic covers the electrical design plan and looks at the activities typically completed at each stage. The presentation outlines the challenges encountered and responsibilities of all parties involved from engineers to certifiers.

- › Project planning and storyboarding
  - › Understanding the design stages
  - › Order of design
  - › The challenge of coordination: what we do and what others do
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## 12:00<sup>pm</sup> - 1:00<sup>pm</sup> Lunch

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## 1:00<sup>pm</sup> - 2:30<sup>pm</sup> Topic Three | Alex Gregory

### Cable and Containment Selection

This presentation looks at the electrical cabling options and outlines what should be considered when making a selection. The cable sizing process is explained: from identifying the current carrying capacity to appropriately de-rating it (based on the installation method outlined in AS/NZS 3008). The presentation covers the various types of cable containment and common pitfalls identified during the installation of each.

- › Cable types and considerations
- › Cable sizing process: current carrying capacity, voltage drop, fault loop impedance and short circuit temperature
- › Containment types: pit, tray, conduit, catenary
- › Special considerations: seismic restraint, fire/acoustic treatment
- › Common design errors
- › What to look for during construction inspections
- › Powercad demo (*time permitting*)



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**2:30<sup>pm</sup> - 3:00<sup>pm</sup>**

**Afternoon Tea**

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**3:00<sup>pm</sup> - 4:00<sup>pm</sup>**

**Topic Four | Dr Yuanyuan Fan (Virtual Presenter)**

### Renewable Integration and Associated Challenges

The world is facing a critical challenge in the form of climate change; it is clear that we must transition to a more sustainable energy system. Renewable energy is a key part of this solution. This topic tackles the various challenges of renewable energy integration, and the implementation of potential solutions. The topic covers popular technologies and concepts such as smart grids, hydrogen and machine learning.

- › Types of renewable integration – what renewable sources are there? How are the popular renewable sources integrated into power grids – distributed or centralised? How power electronics play a role in renewable integration?
  - › Challenges of renewable integration – the inertia problem, the energy storage problem, the electric vehicles issue, and the energy carrier role of hydrogen.
  - › Software modelling and simulation of renewable systems – introduction and hands-on practice.
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**4:00<sup>pm</sup>**

**Day One Close**

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# Day Two | Friday 31<sup>st</sup> March, 2023

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**8:30<sup>am</sup> - 10:00<sup>am</sup>      Topic One | Alex Gregory**

## Electrical Switchboard Design and Installation

This presentation steps through the basics of switchboard design, construction and installation. When designing a switchboard, estimating the size is critical together with where it can be located and how much clearance is required. An important part of reviewing shop drawings is to ensure all the design parameters have been captured, and that sufficient evidence is available to verify compliance to the latest standard of AS/NZS 61439. This is covered today, with what should be examined during a construction inspection.

- › Switchboard basics: components and relevant standards
  - › Switchboard design: types of switchboards and how to size them
  - › Shop drawing review: how to verify shop drawings against a design and to AS/NZS 61439
  - › Switchboard inspections: what to look for during the acceptance test and/or installation inspection
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**10:00<sup>am</sup> - 10:30<sup>am</sup>      Morning Tea**

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**10:30<sup>am</sup> - 12:00<sup>pm</sup>      Topic Two | Mr Deepak Pais (Virtual Presenter)**

## Electrical Safety, Arc Flash

This presentation covers the basics of arc flash and its effects, arc flash studies and risk mitigation options.

- › Arc flash hazards
  - › Hazard risk category
  - › Codes and standards
  - › Arc flash studies
  - › Working distances and arc flash protection boundaries
  - › Arc flash risk mitigation options
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**12:00<sup>pm</sup> - 1:00<sup>pm</sup>      Lunch**

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**1:00<sup>pm</sup> - 2:00<sup>pm</sup>      Topic Three | Alex Gregory**

## Protective Devices & Coordination

Protective devices are a key part of an electrical design, and appropriate selection is key to maintaining the safe and continuous operation of installations during a fault. This presentation outlines the types of electrical faults that can occur, and the differences between circuit breaker types. AS/NZS 3000 mandates the requirements for protective device discrimination.

- › What is a protective device?
- › Overview of protective devices
- › Types of electrical faults
- › Discrimination studies including AS/NZS 3000 requirements
- › Documenting protective devices on design drawings
- › Common design errors
- › Powercad discrimination study demonstration (time permitting)
- › What to look for in site inspections



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**2:30<sup>pm</sup> - 3:00<sup>pm</sup>**

**Afternoon Tea**

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**3:00<sup>pm</sup> - 4:00<sup>pm</sup>**

**Topic Four | Alex Gregory**

### Earthing Systems

Earthing is a fundamental part of low voltage installation in Australia and has multiple purposes including the protection of a system, correct function of equipment, and to serve as equipotential bonding. This presentation describes the different types of earthing used in Australia and what is required under AS/NZS 3000. Lastly, advice on sizing earthing conductors and typical construction installations is provided.

- › Purpose of earthing
  - › Concept of step and touch potential
  - › Types of earthing systems - what is a MEN?
  - › Protective verse functional earthing
  - › Equipotential bonding and static discharge
  - › AS/NZS 3000 Section 5
  - › Sizing of earthing conductors
  - › Typical construction installations
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**4:00<sup>pm</sup> - 4:30<sup>pm</sup>**

**Day Two Close**

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# Tickets & Registration



## Early Bird Offer - 10% Off

### Single Ticket

\$1,400.00\* per person

*\*Save 10% when you book on or before  
16<sup>th</sup> February, 2023*



## Standard Pricing

### Single Ticket

\$1,600.00\* per person

*\*When you book after 16<sup>th</sup> February, 2023*

### Group Booking

\$1,300.00\* per person

*\*When you book for 2 (two) or more people*



**Register Now**

## 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 Adelaide  
27 Frome Street  
Adelaide, South Australia  
**Telephone:** +61870772222

### 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 workshop program, contact us for details to attend individual sessions or to purchase the Workshop Resource Kit.

