



Image: Courtesy of UGL

HV INSTALLATION PLANNING AND DESIGN PRINCIPLES

An Introductory Course for Industrial & Utility Substations

Benefit from a step-by-step study of the HV installations (substation) design process, from initial site review through to start-up & commissioning. The purpose of the course is to provide guidance, criteria, & be a reference tool for the design of substations for medium & high voltage mining, industrial & utility substations.

1 – 2 April 2019 • Sydney

Key Learning Objectives

- ▶ Understand the key items and processes in substation design
- ▶ Understand scoping, standards - especially AS2067, codes and requirements documents
- ▶ Be able to prepare the substation design criteria
- ▶ Preparation of specifications for the various pieces of equipment
- ▶ Be able to prepare design/site options
- ▶ Gain an understanding of the design requirements for earthworks, civil and drainage foundations, structures, fire, and buildings for substations
- ▶ Appreciate environmental and stakeholder issues
- ▶ Understand the requirements for control and wiring diagrams, voltages, ratings, protection, earthing/bonding, metering, SCADA and communication
- ▶ Understand inspection and testing considerations
- ▶ Understand brownfields design differentiation
- ▶ Review commissioning, start-up, operations and maintenance methods

Our Expert Course Instructor



John Giles

With over 46 years' design & construct experience, John is a highly experienced

electrical engineer with a detailed understanding of all aspects of HV Installation engineering for most industries.

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ABOUT THE COURSE

This introductory course in design fundamentals will guide you through a step-by-step study of the substation design and construction process.

The course has been written from the perspective of a design contractor and will discuss various delivery models and the associated challenges. Transmission, sub transmission, distribution as well as private substations will be covered.

You will consider all phases, from initial site review and selection, all the way to substation start-up and commissioning.

You will gain valuable knowledge to help you:

- **Develop** reliable substation designs
- **Develop** HV installation specifications
- **Understand** the requirements of the latest revision of AS2067

The engineering design function in substation development is more than just providing a design and specifications, it requires an understanding of how the installation is going to be installed, operated and maintained.

Unique aspects of building environmental sustainability into site design and layout, structural design, insulation and protection, automation, process control, inspection, testing and maintenance are examined.

The course will provide a comprehensive discussion of all aspects of substation design exploring the issues, criteria and considerations required.

Participants will become more confident with aspects of sustainable substation design, useful during the development of preliminary and front-end studies for substations as well as during detailed design, construction, operation maintenance and start-up/construction.

EXPERT COURSE INSTRUCTOR



John Giles

John is Principal of his own company, Applesed Engineering that provides design training related to the infrastructure industry, and training and facilitation services related to Safety in Design.

With over 46 years' industry experience, 38 with UGL Infrastructure / Kilpatrick Green, John is a highly experienced electrical engineer with a detailed understanding of engineering principles for many industries. He has a broad understanding of civil, structural and mechanical engineering principles and practices.

Beginning as an instrument design engineer, John then held various Chief Engineer positions within UGL Infrastructure for over 30 years. In these roles, John led and maintained the high standard of engineering service for all UGL Infrastructure's projects.

John's wide experience covers many industries including hydro-electric, diesel generation, gas turbine power generation, HV power transmission systems, HV power distribution, water and wastewater treatment, water distribution, control and instrumentation, railway power distribution, microwave and communications networks, building services and process automation. He has been responsible for the design of several projects that won Engineering Excellence Awards.

John led the development of 'Safety in Design' approaches within UGL Infrastructure, introducing tools such as the CHAIR process and HAZOP/CHAZOP reviews. To date, he has conducted over one hundred Safety In Design workshops for electricity and water infrastructure projects. He has fostered the adoption of Safety in Design techniques by many major organisations.

John is dedicated to the development and continued improvement of the engineering profession. He is a Fellow of the Institution of Engineers Australia, is a past member of CIGRE Australian Panel AP B2 and a current Member of Standards Australia Committees EL43 (AS2067) and EL52 (AS7000 and HB331).

He holds an Electrical Engineering Degree, a Physics Degree and a Master of Engineering Science from the University of New South Wales. He was nominated for Professional Engineer of the Year (2012) by UGL and was one of three finalists in the 2015 SafeWork NSW Awards for Best Individual Contribution to Workplace Health and Safety (non WHS representative).

Would You Like To Run This Course On-Site

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If you have 8+ interested people, an onsite course can be an ideal solution. Speak with **Anton Long** or **Holly Baldwin** on +61 (02) 9080 4454 to discuss your customised learning solution, or email training@informa.com.au

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2-Day Intensive Course Outline

Pre-planning

- Determine major criteria
- Determine applicable legislation
- Plan contract format. What form of contract is best
- Determine compliance requirements
- Determine required approvals

Planning

- Choose Location
- Acquisition process
- Write functional requirement specification
- Determine reliability requirements
- Determine acceptable losses

Pre-Design

- Collect information
- Document criteria
- Select design process
- Obtain Standards and Codes
 - Determine which standards are mandatory especially AS2067 and AS3000
- Produce design program

Design

- Gathering data – Design inputs
- Voltage requirements long and short duration
- Current - busbar and feeder ratings
- Structural loads
- Studies load flow, fault, and stability
- Concept expansion
- Equipment selection and specification
 - AIS, GIS, Hybrid
- Busbar configurations/installation arrangements
- Layout General Arrangement
- Layout considerations – design standardisation
- Clearances
- Vector groups/Phasing
- Insulation coordination concepts
- Lightning protection
- Lightning Interception
- Neutral earthing methods
- Primary equipment specifications/considerations
 - Primary plant, Circuit breakers, Disconnectors, Instrument Transformers, CT's, CVT's and VT's
 - Power transformers, reactors
 - Surge arresters, Spark gaps
 - Fuses

- Reactors, Capacitors, Line Traps
- Insulators
- GIS switchgear, GIL
- HV Cables, Cable sealing ends
- Busbar and fittings
- HV Indoor switchgear.
- EMF considerations
- Civil and structural
 - Earthworks and drainage, Civil works, Footings, Structural
 - Strength co-ordination, Load calculation, Load Cases
- Fire and explosion
 - Fire risk assessment, Fire zones, Barriers, Transformers, Oil containment
- Noise
 - Noise limits, Abatement methods
- Earthing
 - Earthing system design process
 - Conductor sizing, Earthing conductor types
 - Earthing of plant and equipment
 - EPR, Conductor layout, Hazardous locations, Earthing interconnections
 - Hazardous Voltages, Transient design
 - Buildings, Modular buildings, Ancillary items to be considered
- Secondary systems
 - Protection, Auxiliary supplies AC and DC
- Brownfields issues

Verification and Validation

- Testing and commissioning, Validation
- FATs and SATs
- Design Reviews
 - CHAIR process (constructability review), ensuring designs meet WH&S Legislation requirements for whole of life safety
 - Safety in Design
- Documentation

WHAT OUR CLIENTS SAY

"The trainer was very helpful in answering questions and presenting the information."

Project Engineer, **Hydro Tasmania**

"Very practical and sound knowledge upon the topic. Up to date knowledge and understanding of various related industrial standards."

Design Engineer, **TEC-C Investments**

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Easy Ways to Register

1 Web
www.informa.com.au/HVInstallation

2 Telephone
+61 (02) 9080 4395

3 Email
training@informa.com.au

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HV Installation Planning and Design Principles

	Location	Course Dates	Super Early Bird price valid until 22 Feb 19		Early Bird price valid until 15 Mar 19		Standard price valid after 15 Mar 19		4+ Dels Discount	
P19GT19SY	Sydney	1-2 Apr 19	\$2,595 + \$259.50 GST	\$2,854.50	\$2,795 + \$279.50 GST	\$3,074.50	\$2,895 + \$289.50 GST	\$3,184.50	\$2,236 + \$223.60 GST	\$2,459.60

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Informa Corporate Learning has a long-standing track record of delivering very successful customised learning solutions achieving real and measurable value for our clients through our senior training consultants.

If you have 8+ interested people, an on-site course can be the ideal solution – giving you the opportunity to customise our course content to your specific training needs, as well as attracting significant savings compared to public course costs.

Why Choose On-site With Informa Corporate Learning?

- 1. Custom design** – Together, we will identify the best blended learning solution for your culture, your people and your training objectives.
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- 3. On-site training** is a cost effective way to train your people and achieve your defined outcomes.

Our Long Standing Clients Include:

Ambulance Victoria, BHP, Department of Planning, Transport & Infrastructure, SA, Origin Energy, Electricity Generating Authority of Thailand (EGAT), ActewAGL, Ajilon, Arrow Energy, Barrick, Chevron Australia, Coffey International, ConocoPhillips, Dalrymple Bay Coal Terminal, Department of Education, ENI Australia, Fortescue Metals Group, IBM, Jemena, Office of the National Rail Safety Regulator, Pacific National, PT Freeport, Public Transport Authority – WA, QGC – BG Group, Rio Tinto, UBS, Woodside, IP Australia, ANU, Health Purchasing Victoria, Telstra, Queensland Rail, EY, Litmus Group and more...

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