Qualified for 30 PDUs by PEB

UNDERGROUND HV SUBSTATION DESIGN

24 – 28 SEPTEMBER 2018, SINGAPORE

Topics Covered

Underground Substations Overview

Planning New Underground Substations

S/S Design Overview

S/S Feasibility of Underground SS Design

Technical Specification for an Underground SS

Tendering Process

Health & Safety in Underground Projects

Expert Course Faculty Leader

In his 30 years working experience, the trainer provided highest quality services in system planning and analysis to major transmission and distribution and transportation companies. He is very experienced in design, procurement, commissioning, erection and refurbishment of major projects in transmission and distribution substations up to 420 kV and hydro and thermal power plants.

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About This Training Course

HV Substations play an important role in the electric power systems. Specific requirements are set for underground substations which are mainly designed in city centers where land, if available, is sold at a premium and it is often the only feasible way to construct it. The most common underground substation types are for major BSP and distribution substations within the DNO as well as substations supplying underground metros or business and commercial canters.
Properly planned and designed substation is essential for reliable operation of a power system network. A new substation should be built to meet the requirements of the growing load and operation under the changing competitive markets. Upgrading of the existing substations would require a comprehensive knowledge of the substation as well as the overall power system. Specific requirements associated with underground installation are addressed in this course with practical examples of resolving technical challenges such as increase heating due to the electrical load and subsequent losses, planned and unplanned maintenance and provision for quick and effective equipment replacement. Safety requests include explosion and fire hazard, fire escape routes, cable routes describing the mitigating measures and specification for this environment.

This course covers all aspects of medium and high voltage substation design with the particular focus on underground substations including regulatory requirements and general design considerations from feasibility through technical specification and tendering to the detail design. A practical understanding of planning, design, technical specification application and a step by step approach of the underground substation design process is explained as well as design documentation for each design stage.
Health & safety and environmental issues relevant for the underground substation design are covered in this comprehensive course.

Course Learning Overcome

- Learn the latest criteria and practical techniques for the design of Underground HV substations
- Understand a step by step approach of the substation design process from initial site survey, underground substation concept, technical specification to the detail design of equipment
- Gain knowledge of the technical requirements, configuration philosophies
- Gain knowledge of design practices and work processes
- Learn how to specify equipment for a new underground substation
- Learn how to manage the underground substation design
- Have a comprehensive understanding of specific substation components
- Gain knowledge of underground substation layout and busbar design
- Help engineers and technicians to work with confidence to ensure continuous supply with complete reliability by minimizing interruptions
- Understand the safety considerations of underground substations
- Understand the environmental aspects of underground substation design and critical factors involved
- Gain knowledge of reliability considerations and maintenance considerations in the design stage
- Understand the technical aspects involved in the selection of major equipment in underground substations
- Gain knowledge of specific substation earthing design
- Understand design documentation from general arrangement to schematic diagrams
- Learn how to manage the design

Who Should Attend

- Design Engineers/Technicians in DNO and Metro transportation companies
- Industrial and Utility Engineers/Technicians
- Managers of design engineering departments
- Electrical Engineers/Technicians
- Commissioning Engineers/Technicians
- Consulting Engineers/Technicians
- Planners of Power Systems
- Project Engineers
- Safety Professionals
- Others who want a knowledge of a substation design

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5 Day Course Outline

DAY 1

Introduction

Underground Substations Overview

- Substations in Power Systems
- Substations Overview
- Substation Types

Planning New Underground Substations

- Planning Overview
- Planning Methodology
- Power System Design

S/S Design Overview

- S/S Design Overview
- S/S Design Structural Diagram

S/S Feasibility of Underground SS Design

- Site Selection
- Feasibility Optimal Design
- Appraisal
- Feasibility Design Example

DAY 2

Technical Specification

- Specification Concept for Underground SS
- General Requirements
- Specifying Plant
- Specification for Switchgear
- Specification for Transformers
- Specification for HV Connections
- Specification for S/S Earthing System

DAY 3

Technical Specification for an Underground SS

- Specification for LVAC Supply
- Specification for LVDC Supply
- Specification for Protection
- Specification for Control
- Specification for Civil Works

Tendering Process

- Inquiry Document
- Tender Criteria
- Tender Review
- Contract Award

Health & Safety in Underground Projects

- Methodology for H&S
- Managing Health & Safety in Projects
- Designer Duties
- Health & Safety Plan
- Risk Assessment

DAY 4

Initial Contract Design

- Overview
- Single Line Diagrams
- Layouts
- S/S Earthing System
- Selecting HV Switchgear
- Transformers
- Selecting HV Connections
- Selecting Protection
- Selecting Control System
- Selecting Multicore Cables

DAY 5

Health & Safety in the Contract Design

Managing Design

- Detail Design Documentation
- Competency in the Design
- Design Coordination
- Design Approvals

Detail Design

- Detail Design Overview
- Civil Design
- LVAC System
- LVDC System
- Switchgear
- Transformers
- HV Connections
- Protection
- Control System

Design Support in the Construction

Course Summary & Closure

About Our Expert Course Trainer

In his 30 years working experience the trainer provided highest quality services in system planning and analysis to major transmission and distribution and transportation companies including London Underground, National Grid Company (UK), MTRC Metro in Hong Kong, West Coast Main Line connection to NG, Scottish Power, ESB-Ireland, ESKOM-South Africa, Mauritius CEB, Balkan countries - grids of Romania and former Yugoslavia, HV network ISA-Colombia, Western Power Distribution-UK, etc.

His technical expertise includes most aspects of power systems analysis, electrical asset management and railway connections to power networks where he provides solutions to technical problems and supports other field's experts in complex assignments. He has project management skills in technical and environmental projects as well as experience in short and long-strategic term planning, maintenance and asset management, power quality analysis of transmission and generation systems, distribution, transportation and other power networks. Experienced in generation and network integration, electrical component of energy master plans as well as strategic asset replacement, he was also involved in load- forecast analysis and generation dispatching. Published papers on asset management based on projects and experience in working for distribution companies in Africa and Europe.

The trainer is very experienced in design, procurement, commissioning, erection and refurbishment of major projects in transmission and distribution substations up to 420 kV and hydro and thermal power plants. Served as project manager on several major projects as well as head of the Engineering Group, he was responsible for final design, equipment specifications, layouts tender evaluation and commissioning. He has carried out conceptual development of protection and control philosophy for various projects as well as reviewed and approved project drawings and documents. He has applied the latest IEC standards, various codes of practice and engineering recommendations. He has also specific experience in conceptual design of power supply for transportation and traction railway systems, defining the design principles and technical specifications for future design and privatization process. He has analysed quality of power supply for connection of AC and DC unbalanced load to power network and published papers on practical implementation. He carried out feasibility studies on reactive compensation (SVC and MSC) focusing on voltage variation and harmonic distortion issues.

He has performed technical and economic evaluations, cost benefit net present value analysis, of various transmission and distribution schemes and electrical equipment. He carried out a number of asset evaluation analysis on electrical equipment and published papers on asset management, reliability and maintenance. He has performed equipment assessment and residual life prediction as part of strategic asset management analysis for a major underground transportation company in Asia. His duties have also included equipment arrangement optimisation in particular reliability aspect in terms of failure rate and financial consequences as non-supplied energy to the consumers.

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	PER PARTICIPANT	2 PARTICIPANTS OR MORE	IN-HOUSE TRAINING
5 Day Programme	SGD 3,474 Per Participant	SGD 3,274 Per Participant	Guaranteed Minimum 40% Off Normal Price
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