

# HV Network Planning and Design

## Course overview

This course is built around the principle that HV planning and design tools are only as good as the person using them. To utilise planning tools effectively, good designers will fully understand what is required to be achieved and can recognise when outputs are incorrect. This 2-day course works towards this objective and combines the theory of network planning to relevant GB standards and legislation with the practice of carrying out load flow studies and calculations to ensure compliance with those standards.

Fault Level, Voltage and Network Capacity Planning are all considered along with supporting knowledge in the areas of earthing design, basic HV protection and typical HV supply connection arrangements. The core concepts are reinforced through network design exercises using both hand calculations and software planning tools, enabling delegates to:

- Understand how to configure power flow analysis tools in terms of slack bus, customer loads and generation
- Complete basic network studies required to determine compliance with GB standards
- Understand the studies required to determine the impact of generation and point of connections

Cost: Two-day course: £935 + VAT

Location: EA Technology, Capenhurst, CH1 6ES

## Who should attend?

You should attend this course if you are seeking to expand your capabilities into HV connection design, (load and generation) or general network planning. The course will provide a thorough grounding in the basic principles of network design and competent performance of network studies for determining points of connection or network reinforcement. It is therefore very suitable for those who will be expected to follow design processes, but who also want to understand the underlying reasons behind those processes.

Delegates whose roles would be enhanced with greater knowledge of the constraints which network planning must operate within would also greatly benefit from the course.

## Benefits of attending this course

- Understand the constraints which are to be balanced to produce compliant HV design
- Be able to set up a typical HV network model and use it to perform studies required for new load and generation connections at HV
- Understand what model outputs mean and how they relate to the constraints being managed
- Appreciate the impact of regulation (CI, CMLs, losses incentives) on design

Substations Courses

Specialist Courses

Cables Courses

Power Networks Courses

Protection Courses

Tailored Programmes

# HV Network Planning and Design

## Course programme

### Day one

#### Introduction

- Network planning within network constraints

#### Security and reliability

- Licence conditions and standards
- P2/6
- Calculating network capacity
- Understanding the balance between ratings and demand
- Applying distributed generation for system support
- Relating network equipment and network topology to the standard
- Cost of loss of supply
- P2/6 compliance exercise

#### Safety

- HV network standards
- Planning tools - customer modelling
- Fault levels:
  - » Equipment that is effected and why it has to be assessed
  - » Introduction to G74 for determining contributions to short circuit currents at HV
- Calculating fault levels and practical exercise

#### HV network earthing

- Legislation and standards
- Introduction to ROEP and impedance
- Touch and step potentials
- HV earthing design considerations
- Hot or cold substation sites

#### HV protection systems

- The role of protection systems
- Types of protection found at HV
- Understanding the values

### Day two

#### Introduction

- Programme for the day - recap of day 1

#### Customer connection equipment

- Essential components of any connection
- Representing customers and sources of data for use in modelling demand

#### Network modelling

- Power system modelling
- Network modelling exercise:
  - » Creation of a slack bus
  - » Building a primary substation
  - » Building a cable network
  - » Representing existing customers
  - » Adding a new customer

#### Capacity and fault level studies

- Capacity and fault level study practical - perform a study on the network model:
  - » Perform a security of supply study
  - » Compare fault levels with hand calculation exercise
  - » Determine compliance

#### Power quality

- Legislation and standards relating to power quality
- Statutory voltage limits and network common practice
- Harmonic distortion
- Standards and limits relating to voltage dips and flicker and the sort of loads to which they refer
- Impact of generation on networks
- Voltage study practical

#### Open discussion

Programme may be subject to amendment



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