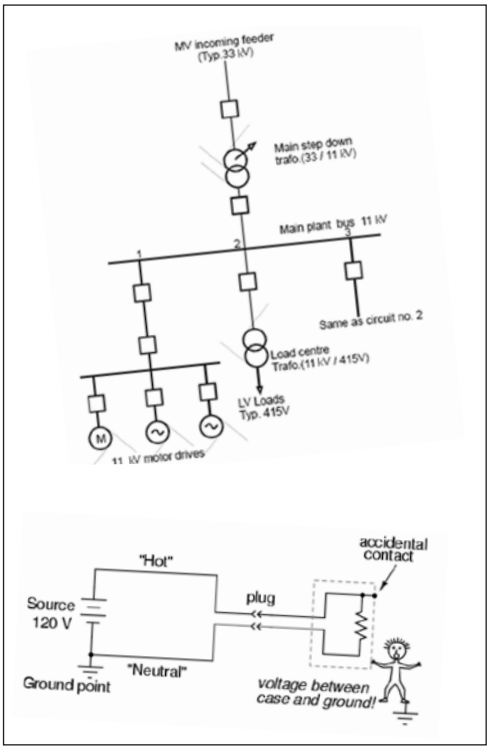
HIGH VOLTAGE DESIGN AND INSTALLATIONS MASTER CLASS (UK)



WHAT YOU WILL GAIN:

- Update your knowledge on best practice and find practical solutions to your HV design and installations issues
- Network with experienced experts and your peers
- How to design to the BS EN 61936-1:2010 standard
- Learn how to plan a HV substation to meet the load demand, customer's expectations, and site conditions
- Learn how to design a HV substation based on current engineering practices
- Team work to solve worked HV examples and case studies

WHO SHOULD ATTEND:

This is a master class for electrical engineers and technologists and associated disciplines involved in high voltage design, installation, inspection, testing and commissioning, e.g.:

- Design engineers
- Electrical engineers
- Instrumentation engineers
- Electrical technicians
- Project engineers
- Plant operators

IDC TECHNOLOGIES

Technology Training that Works

The Workshop

This intensive two-day master class addresses the BS EN 61936-1:2010 standard (substations and high voltage installations exceeding 1kV a.c.) in a practical applied manner.

This standard applies to all customer and utility high voltage installations and compliance is mandatory.

This course will extract the key elements of the standard and apply it via a series of case studies in the following structure:

- Planning
- Design
- Installation
- Commissioning, Testing and Validation

As per the Scope Statement in Section 1 of the 'Standard' documents: 'This standard provides minimum requirements for the design and erection of high voltage installations in systems with nominal voltages above 1 kV a.c. and nominal frequency up to and including 60Hz, so as to provide safety and proper functioning for the use intended'.

Case Study Based

The case study will cover all the typical design phases for a large industrial installation. The design phases could typically be described as: the conceptual design of the incoming HV supply and internal HV distribution (taking into account the plant's requirements and need for operational flexibility and redundancy etc), the design of any aerial HV lines required, the design of any major underground cable circuits required, the design of substations including earthing systems required, selection of type of HV switchgear required, selection and design of the protection systems typically required.

This course is aimed at the private electrical installation designer. However, the topic HV design and installation could also be interpreted as possibly covering the electricity utility transmission and distribution sector (HV transmission and distribution network design) for which the HV design approach would be quite different, even though the technical fundamentals (and some of the technical standards such as BS EN 61936-1:2010) are the same. This will not be the focus of this presentation.

To gain full value from this workshop, please bring your laptop/notebook computer.

The Program

STANDARD BS EN 61936-1:2010 (SUBSTATIONS & HV INSTALLATIONS)

- Scope & definitions
- Exclusions
- Status
- Contents
- Fundamental requirements
- Safety measures
  - Earthing systems
  - Insulation coordination
  - Basic insulation level (BIL)
  - Electric shock
  - Power frequency test

POWER SYSTEM PLANNING

- Planning criteria
  - Safety
  - Reliability
  - Flexibility
- Load forecasting
- Voltage selection
- Site conditions
  - IP class
  - Soil resistivity
- Security of supply
  - Busbar configurations
- System studies
  - Load flow analysis
  - Fault calculations

EARTHING SYSTEM DESIGN

- Need for earthing
- Earthing electrodes
- Earthing mesh
- Equipotential bonding
- Static charges
- Lightning and its effects
- Earthing methods
  - Ungrounded
  - Solidly earthed
  - Resistance earthed (NER)
  - Impedance earthed
  - Resonant earthing (tuned reactor)
- Soil resistivity
- Touch potential
- Step potential
- Earthing of MV/LV installations
- Lightning protection

POWER SYSTEM PROTECTION

- Relay types
- Fault types
- Protection functions
- Protection criteria
  - Speed
  - Stability
  - Sensitivity
  - Simplicity
  - Selectivity
- Current transformers
  - CT ratio
  - Burden
  - CT error
  - CT accuracy class
- Voltage transformers
  - VT ratio
  - VT error
  - VT accuracy class
- Protection techniques
  - IDMT
  - DT
  - High-set instantaneous
  - Directional protection
  - Differential protection
  - Distance protection
- Protection schemes
  - Feeder protection
  - Transformer protection
  - Line protection
  - Motor protection

OVERHEAD SYSTEM DESIGN

- Line design criteria
- Line definitions
  - Sag
  - Span
  - Slack
  - Swing of conductor
  - Conductor tension
- Overhead line design
  - Line conductor codes
  - Line conductor ampacity
  - Line conductor sizing
    - Line conductor fault capacity
    - Line capacity voltage drop

UNDERGROUND CABLE DESIGN

- Cable system criteria
  - Cable codes
  - Cable ampacity
  - Cable sizing
    - Derating factors
    - Cable fault capacity
    - Cable voltage drop

SUMMARY, OPEN FORUM AND CLOSING