



Training Program:

Advanced Power System Analysis In Electrical Networks Using ETAP Power Station

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Introduction:

Power systems equipment must withstand not only the rated voltage, which corresponds to the highest voltage of a particular system, but also expected short level. Accordingly, it is necessary to set protective relays based on these results obtained from short circuit study. One of hot issues now related to these is arc flashing study which is mainly based on the studies of short circuit and relay co-ordination as well. All these three issues should be dealt as integral parts & bulk.

Power System Analysis means verifying the adequacy of the power distribution system and its components recognize coordination related disturbances and outages and collecting the required data to perform a detailed required study.

The continuity and quality of electricity delivered safely and economically by today's and future electrical power networks are important for both developed and developing economies. The correct modeling of power system equipment and correct fault analysis of electrical networks are pre-requisite to ensuring safety and they play a critical role in the identification of economic network investments. Environmental and economic factors require engineers to maximize the use of existing assets which in turn require accurate modeling and analysis techniques.

Who Should Attend?

This course is intended for anyone who must perform calculations, provide settings or approve the work performed by others. The trainee should be a graduate engineer or have the equivalent practical work experience in electrical power systems. i.e.

- Consulting Engineers.

- Electrical Engineers.
- Project Engineers.
- Maintenance Engineers.
- Commissioning & testing Engineers.

Objective:

On successful completion of this course, participants will be able to:

- Understand importance of power system modeling
- Understand the need for calculation the short circuit current.
- Consequences of sustained fault current & type if faults.
- Manual calculation of short circuit using simple methods like MVA method, P.U. system, etc...
- Balanced & unbalanced power flow analysis.
- Voltage drop
- Analyze the motor starting/acceleration.
- Switchgear rating (breaking & making capacities).
- Power problem problems & assessment.
- Importance of arc flashing and relay co-ordination studies from operation & safety point of view.
- Test cases simulation using computer software's.

Course Outline

Day 1

- Overview of ETAP Capabilities & Limitations.
- One-Line Diagram/One line View (OLV).
- Creating & Merging different revisions, presentations & configuration
- Scenario, Study & Project Wizards.
- Crystal Reports & Customizations.
- AC & DC Element Descriptions.

Day 2

- Load modeling.
- Add, updating and remove from ETAP library.
- Electrical systems modeling and fundamentals.
- Load flow (balanced & unbalanced) analysis.
- Load Flow & Cable sizing.
- Transformer sizing.
- Benefits of calculated short circuit currents.

Day 3

- Introduction to Fault current Calculations in brief.
- Breaking & making currents.
- Per unit systems.
- Different typical values of positive, negative & zero phase sequence impedances for unbalance faults.
- Manual Calculations of Isc by MVA Method.
- Calculation of Isc by Impedance method.

Day 4

- Calculation of Isc by symmetrical components.
- Calculations as defined & recommended by IEC/ANSI standards.
- Short Circuit Studies (Fault-Levels – Switchgear/Fuse Rating). Typical cases for switchgear sizing.
- Relay co-ordination & Arc Flashing studies.
- Coordination Fundamentals
- Procedures
- Data Collection
- Plotting Time/Current Curves
- Relay Coordination Intervals

Day 5

- Equipment's damage curves for cables, transformers, etc...
- System Modeling for Device Coordination Study
- ETAP Star (Device Co-ordination/selectivity).
- System earthing (Solid, resistance & reactance or even ungrounded systems)
- Substation grounding grid design & Calculations.
- Motor Parameter Estimation.
- Motor Acceleration Analysis (Dynamic & Static).
- Different test simulation cases using ETAP power station version 7.00.

Accreditation:

BTS attendance certificate will be issued to all attendees completing a minimum of 80% of the total course duration.