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COURSE BROCHURE

Advanced Plant Electrical Design Studies and Review Training Course

28 February – 11 March 2027
Manama

Advanced Plant Electrical Design Studies and Review Training Course

Ref: 2540_96492 **Date:** 28 February – 11 March 2027 **Location:** Manama **Fees:** 8000 GBP

Plant Electrical Design Studies and Review is a 2-week advanced training course for senior electrical engineers and technical leads in plants and utilities, who compile an electrical design review dossier for a live or planned installation. Larger drives, on-site generation and denser loads push industrial networks toward fault and thermal limits. Jupiter Prime Training presents Plant Electrical Design Studies and Review as the discipline that checks those limits before equipment is bought or energised.

Why Plant Electrical Design Studies and Review Matters Now

Three forces shape the subject: expansions adding load to ageing networks, drives and inverters that inject harmonics and change fault behaviour, and owners who expect documented studies before energisation. Sound studies avoid undersized switchgear and unsafe touch voltages; weak ones surface as failures at commissioning. The course rests on load flow analysis, short-circuit calculation practice, protection coordination and IEC 61850 substation communication for modern switchboards.

Who Gains Most from Plant Electrical Design Studies and Review

- Engineers who approve single-line diagrams and equipment ratings
- Leads who check consultant and contractor study reports
- Specialists who set and coordinate protective devices
- Engineers who size cables, transformers and earthing systems
- Leads who plan motor and drive additions on existing networks

Plant engineering and utility design offices gain most when reviewers and designers attend together.

Plant Electrical Design Studies and Review Capabilities

Participants challenge every number in a study report and trace it to network data.

- Calculate prospective fault currents and verify equipment breaking capacity — switchgear purchasers
- Assess voltage drop and motor starting with load flow results — process owners
- Design earthing grids against step and touch voltage limits — site safety leads
- Specify harmonic limits and filtering for drive-heavy networks — power quality owners
- Test protection coordination curves for selectivity — operations managers
- Communicate design review findings with clear acceptance criteria — project sponsors

Key Plant Electrical Design Studies and Review Terms

- Single-line diagram — a simplified drawing of a network showing sources, buses, feeders and protective devices.
- Prospective fault current — current that would flow at a point during a bolted short circuit.
- Load flow study — calculation of voltages and power flows under set operating conditions.
- Step and touch voltage — potential differences a person may bridge during an earth fault.
- Total harmonic distortion — ratio of harmonic content to the fundamental waveform.
- Discrimination — selectivity so only the device nearest a fault operates.

Plant Electrical Design Studies and Review Day by Day

Day 1: Network Context and Study Scope

- Single-Line Diagram Audit — Accurate Study Basis
- Plant Load Growth Profiles — Network Headroom
- Study Input Data Sheets — Equipment Parameter Accuracy
- Utility Supply Interface — Fault Level and Voltage Limits
- Design Review Stages — Gate Decisions in Projects

Day 2: Load Flow Studies

- Bus Voltage Profiles — Tap Setting Choices
- Transformer and Cable Loading — Thermal Margins
- Reactive Power Balance — Capacitor Bank Sizing
- Contingency Cases — Standby Supply Arrangements
- On-Site Generation Scenarios — Islanded Operation Planning

Day 3: Short-Circuit Calculations

- Symmetrical Fault Calculation — Breaker Duty Checks
- Unbalanced Fault Analysis — Earth Fault Levels
- Motor Fault Contribution — Switchboard Ratings
- Peak and Breaking Currents — Busbar Withstand
- Fault Level Mitigation Options — Network Reconfiguration

Day 4: Earthing System Design

- Soil Resistivity Surveys — Grid Design Inputs
- Earth Grid Resistance Calculation — Fault Return Path
- Step and Touch Voltage Checks — Personnel Safety
- Neutral Earthing Methods — Fault Current Limitation
- Lightning and Surge Bonding — Equipment Protection

Day 5: Machines and Motor Starting

- Motor Starting Voltage Dip — Process Continuity
- Starting Method Selection — Direct, Soft or Drive
- Generator Capability Curves — Reactive Support Limits
- Transformer Inrush Effects — Protection Stability
- Large Motor Acceleration Studies — Driven Load Matching

Day 6: Power Quality and Harmonics

- Harmonic Source Modelling — Drive and Rectifier Loads
- Total Harmonic Distortion Limits — Point of Common Coupling
- Resonance Scans — Capacitor Placement Risk
- Passive and Active Filters — Mitigation Selection
- Voltage Sag Assessment — Sensitive Process Ride-Through

Day 7: Protection Coordination

- Time-Current Curve Plotting — Selectivity Proof
- Overcurrent and Earth Fault Settings — Feeder Protection
- Differential Protection Zones — Transformer and Busbar Security
- Arc Flash Incident Energy — Work Category Labelling
- IEC 61850 Substation Communication — Digital Relay Integration

Day 8: Equipment Specification and Selection

- Switchgear Rating Schedules — Purchase Specifications
- Cable Sizing Calculations — Derating and Short-Circuit Withstand
- Transformer Specification — Impedance and Vector Group Choice
- Uninterruptible Supply Sizing — Critical Load Autonomy
- Drive System Specification — Motor and Network Compatibility

Day 9: Conducting the Design Review

- Study Report Checklists — Consistent Review Depth
- Assumption Challenge Sessions — Hidden Data Errors
- Comment Resolution Registers — Closure Tracking
- Constructability and Maintainability Checks — Operations Input
- Commissioning Test Links — Verification of Study Results

Day 10: Practising the Electrical Design Review Dossier

- Applying Load Flow Results — Case Network Verdict
- Applying Fault and Earthing Checks — Equipment Adequacy
- Applying Coordination Curves — Selectivity Findings
- Peer Review of Findings — Acceptance Criteria Agreement
- Completing the Electrical Design Review Dossier — Approval Recommendation

Applying Plant Electrical Design Studies and Review After the Course

- Re-check fault levels on one switchboard
- Review a pending contractor study report with the checklist

Plant Electrical Design Studies and Review Questions FAQ

What is plant electrical design studies and review and why does it matter now?

It is the set of load flow, fault, earthing, harmonic and protection studies proving a plant network is safe. It matters now because expansions and drives push older networks to their limits.

Which roles gain most from plant electrical design studies and review?

Senior electrical engineers, protection specialists and technical leads gain most, especially if you sign off contractor studies.

How does plant electrical design studies and review differ from an electrical maintenance course?

It works on calculations before equipment is bought or energised, while a maintenance course covers testing and repair in service.

What do you bring back from plant electrical design studies and review?

You bring back a review checklist, worked study examples and a reusable dossier format.

Plant Electrical Design Studies and Review: The Way Forward

The electrical design review dossier first informs whether a network can accept a planned load or needs reinforcement. Design leads use it to approve or return contractor studies. After its first use, revisit the input data sheets, since outdated equipment parameters often mislead study results.