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COURSE BROCHURE

# Capacitor Bank Applications and Switching Problems Training Course

9 – 13 August 2027
Dar es Salaam

# Capacitor Bank Applications and Switching Problems Training Course

**Ref:** 3221_122553 **Date:** 9 – 13 August 2027 **Location:** Dar es Salaam **Fees:** 7900 GBP

Capacitor Bank Applications and Switching Problems Training Course is a 1-week training course for electrical design, protection and maintenance engineers, centred on a capacitor bank switching and protection review. Growing motor, drive and renewable loads push networks and plants to add reactive support, yet every energised bank brings inrush, overvoltage and resonance risks with it. Jupiter Prime Training presents this course for engineers who place, switch and look after capacitor banks.

## Why Capacitor Bank Applications and Switching Problems Matters Now

Two pressures shape this subject today. Network operators and industrial plants add shunt banks to hold voltage and release transformer and cable capacity, while variable loads and inverters make the switching duty harsher and more frequent. An organisation that handles banks well gains steady voltage and lower losses; one that handles them badly sees nuisance tripping, damaged drives and shortened equipment life. The course rests on transient analysis, resonance screening and unbalance protection principles, explained in general engineering terms.

## Who Gains Most from Capacitor Bank Applications and Switching Problems

- Engineers who choose bank size, location and connection for networks and plants
- Engineers who set unbalance, overcurrent and overvoltage protection for banks
- Engineers who specify breakers, vacuum switches and inrush reactors for switching duty
- Engineers who inspect, test and replace cans, fuses and reactors in service
- Engineers who investigate tripping, fuse blowing and equipment damage after switching events

A substation or plant electrical group gains most when its design, protection and maintenance members attend together, since bank problems usually cross all three roles.

## Capacitor Bank Applications and Switching Problems Capabilities

Participants link where a bank sits, how it is switched and how it is protected to the failures seen in the field.

- Calculate reactive power need and select bank size and step arrangement — network voltage support decisions
- Assess energising inrush and back-to-back switching currents — switching device and reactor selection
- Test for parallel resonance with nearby harmonic sources — detuning reactor decisions
- Specify unbalance protection settings for wye and double-wye banks — protection engineers
- Design an inspection and capacitance testing routine — maintenance supervisors

- Communicate switching risks and restrictions to operators — control room staff

## Key Capacitor Bank Applications and Switching Problems Terms

- Shunt capacitor bank — a group of capacitor units connected between phase and earth or neutral to supply reactive power locally.
- Inrush current — the brief high current that flows when a discharged bank is energised.
- Back-to-back switching — energising one bank while another bank is already live nearby, producing very high inrush frequency.
- Restrike — re-ignition of the arc across an opening switch, which can drive overvoltages onto the bank and network.
- Parallel resonance — a condition where bank capacitance and network inductance amplify a harmonic voltage at one frequency.
- Unbalance protection — a scheme that detects failed capacitor elements by measuring neutral current or voltage shift.

## Capacitor Bank Applications and Switching Problems Day by Day

### Day 1: Where Capacitor Banks Earn Their Place

- Reactive Power and Voltage Profile Studies — Bank Location on Feeders
- Substation Versus Load-End Banks — Loss and Capacity Trade-Offs
- Fixed, Switched and Stepped Bank Arrangements — Control Strategy Choice
- Industrial Plant Banks for Motors and Drives — Plant Voltage Stability
- Bank Rating, Voltage Class and Connection — Equipment Specification Basis

### Day 2: Switching Transients and Inrush

- Single Bank Energising Transients — Overvoltage Seen by Nearby Equipment
- Back-to-Back Inrush Frequency and Magnitude — Current Limiting Reactor Sizing
- Synchronous Closing and Pre-Insertion Devices — Transient Reduction Choice
- Voltage Magnification at Customer Banks — Drive Tripping Risk
- Restrike and De-Energising Overvoltages — Switching Device Duty Selection

### Day 3: Resonance and Harmonic Interaction

- Network Impedance Scan With Bank Steps — Resonance Frequency Location
- Harmonic Source Inventory Near the Bank — Amplification Risk Ranking
- Detuned Reactor Selection — Shifting Resonance Away From Harmonic Orders
- Capacitor Unit Thermal and Voltage Limits — Allowable Harmonic Loading
- Field Measurement of Bank Currents — Confirming Study Results

### Day 4: Protection and Maintenance of Banks

- Externally and Internally Fused Units — Fuse Coordination Choice
- Neutral Current and Voltage Unbalance Schemes — Element Failure Detection
- Overcurrent, Overvoltage and Discharge Provisions — Safe Bank Isolation
- Capacitance Measurement and Thermal Imaging — Unit Replacement Timing
- Switch, Reactor and Fuse Inspection Routine — Bank Availability

## Day 5: Practising the Capacitor Bank Switching and Protection Review

- Sizing and Location Check for a Sample Feeder — Bank Placement Confirmation
- Inrush and Transient Assessment for That Bank — Switching Device Choice
- Resonance Screening With Plant Drive Loads — Detuning Requirement
- Unbalance Setting Calculation — Alarm and Trip Thresholds
- Capacitor Bank Switching and Protection Review — Completed Engineering Record

## Applying Capacitor Bank Applications and Switching Problems After the Course

- Run an impedance scan on one site with switched banks and record any resonance near harmonic orders
- Review unbalance alarm and trip settings on one bank against its present fuse and element arrangement

## Capacitor Bank Applications and Switching Problems Questions FAQ

### What are capacitor bank applications and switching problems, and why do they matter now?

They cover where banks supply reactive power and the inrush, overvoltage and resonance their switching causes. They matter now because heavier motor, drive and inverter loads make banks more common and their switching duty harsher.

### Which roles gain most from capacitor bank applications and switching problems training?

Design, protection and maintenance engineers responsible for banks on networks or in plants gain most.

### How does capacitor bank applications and switching problems training differ from a harmonics filter design course?

It centres on bank placement, switching transients and bank protection, treating harmonics only where they interact with banks. A filter design course goes deeper into distortion sources and filter sizing.

### What do you bring back from capacitor bank applications and switching problems training?

You bring back a worked review of one bank covering sizing, inrush, resonance and unbalance settings.

## Capacitor Bank Applications and Switching Problems: The Way Forward

The capacitor bank switching and protection review first informs whether an existing bank needs an inrush reactor, a detuning reactor or new unbalance settings. Design, protection and maintenance engineers use it to agree changes before the next outage. After its first use, revisit the resonance screening whenever new drives or inverters connect nearby, because network impedance shifts with them.