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COURSE BROCHURE

# Advanced Distribution Reinforcement and Voltage Control Training Course

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New York

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Registered in the United Kingdom and Saudi Arabia

# Advanced Distribution Reinforcement and Voltage Control Training Course

**Ref:** 2583_98276 **Date:** 29 March – 9 April 2027 **Location:** New York **Fees:** 17000 GBP

Distribution reinforcement and voltage control is a 2-week training course for distribution network engineers and planners who decide where medium and low voltage networks need new capacity and how voltage stays within limits; participants build a network reinforcement plan. Electrification of heating, transport and industry is pushing older feeders towards thermal and voltage limits faster than investment cycles expected. Jupiter Prime Training treats distribution reinforcement and voltage control as a planning discipline.

## Why Distribution Reinforcement and Voltage Control Matters Now

Three forces shape distribution reinforcement today. Customer load is changing shape as electric vehicle charging, heat pumps and rooftop solar add new peaks and reverse power flow. Investors expect each upgrade to defer the next rather than simply add copper. Connection applicants want quick answers on available capacity. A utility that plans well connects new load sooner and spends capital where headroom is truly short; one that plans badly overbuilds some feeders and meets voltage excursions only after customers complain. The course rests on load flow studies, thermal ratings and protection grading.

## Who Gains Most from Distribution Reinforcement and Voltage Control

- Engineers who prepare medium voltage feeder and primary substation load studies
- Planners who set low voltage network design rules for new housing and commercial connections
- Engineers who specify tap changers, voltage regulators and capacitor banks
- Connection assessors who judge whether new demand or generation fits existing headroom
- Asset investment engineers who rank reinforcement schemes for the capital plan

A planning group that sends its load study, connection and investment engineers together gains most, because each reinforcement decision crosses all three desks.

## Distribution Reinforcement and Voltage Control Capabilities

Participants leave able to turn a demand forecast into a ranked list of feeder upgrades, each with a voltage case and a protection check.

- Forecast feeder peak demand by customer class and new load type — capital plan timing
- Calculate voltage drop and rise along medium and low voltage feeders — connection offers
- Specify on-load tap changer, line regulator and capacitor settings — voltage headroom
- Compare conductor upgrade, new feeder and interconnection options — reinforcement scheme selection
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Test protection grading after network reconfiguration — fault clearance on altered feeders
- Build a costed reinforcement sequence across several years — investment committee approval

## Key Distribution Reinforcement and Voltage Control Terms

- Voltage headroom — the margin between calculated feeder voltage and the permitted upper or lower limit at the most exposed customer point.
- Thermal rating — the maximum current a cable, line or transformer carries continuously without exceeding its permitted conductor temperature.
- After diversity maximum demand — the expected peak load of a group of customers, lower than the sum of individual peaks because peaks rarely coincide.
- On-load tap changer — a transformer device that adjusts winding ratio under load to hold secondary voltage near its target band.
- Reverse power flow — power travelling from customer generation back towards the primary substation, which can raise feeder voltage above limits.
- Firm capacity — the load a substation can supply with its largest single transformer or circuit out of service.

## Distribution Reinforcement and Voltage Control Day by Day

### Day 1: Pressures on Distribution Capacity

- Electrification Load Scenarios — Which Feeders Face Earliest Constraint
- Rooftop Solar And Reverse Power Flow — Voltage Rise Exposure
- Connection Queue Review — Timing Of Capacity Requests
- Network Asset Age Profile — Overlap Of Renewal And Reinforcement
- Planning Horizon Selection — Balance Of Short And Long Investment

### Day 2: Forecasting Feeder Demand

- Customer Class Load Profiles — Peak Hour Contribution By Segment
- After Diversity Maximum Demand Tables — Low Voltage Design Loads
- Electric Vehicle Charging Uptake Curves — Evening Peak Growth
- Heat Pump Winter Demand Models — Cold Spell Feeder Loading
- Spatial Load Allocation — Substation Level Growth Assignment

### Day 3: Load Flow Studies for Planners

- Feeder Network Model Build — Data Quality For Study Confidence
- Balanced And Unbalanced Load Flow — Phase Loading Decisions
- Time Series Load Flow — Hourly Headroom Across The Year
- Thermal Loading Checks — Cable And Transformer Overload Risk
- Study Case Library — Consistent Assumptions Across Planning Teams

## Day 4: Voltage Limits and Headroom

- Voltage Drop Calculation Along Radial Feeders — Remote Customer Compliance
- Voltage Rise From Embedded Generation — Export Limit Setting
- Voltage Unbalance Assessment — Single Phase Connection Allocation
- Low Voltage Headroom Mapping — Connection Offer Speed
- Voltage Complaint Investigation Records — Hidden Constraint Detection

## Day 5: Voltage Regulation Equipment

- On-Load Tap Changer Control Bands — Primary Substation Voltage Target
- Line Drop Compensation Settings — Load Dependent Voltage Support
- Pole Mounted Voltage Regulators — Long Rural Feeder Correction
- Switched Capacitor Banks — Reactive Support And Losses Trade-Off
- Low Voltage Regulating Transformers — Solar Rich Street Voltage Control

## Day 6: Reinforcement Options

- Conductor And Cable Uprating — Lowest Cost Thermal Relief
- New Feeder And Circuit Splitting — Load Transfer Between Sources
- Secondary Substation Uprating Or Insertion — Low Voltage Capacity Growth
- Interconnection And Open Point Moves — Firm Capacity Recovery
- Flexible Demand And Storage Alternatives — Deferral Of Network Build

## Day 7: Protection After Reinforcement

- Fault Level Recalculation — Switchgear Rating Adequacy
- Overcurrent Relay Grading Review — Discrimination On Changed Feeders
- Recloser And Sectionaliser Placement — Rural Fault Isolation
- Earth Fault Settings With Embedded Generation — Sensitivity And Stability
- Protection Setting Change Records — Field Implementation Control

## Day 8: Automation and Network Visibility

- Remote Controlled Switching Points — Restoration Speed And Load Transfer
- Low Voltage Monitoring Devices — Measured Versus Modelled Headroom
- Smart Meter Voltage Data Use — Feeder End Voltage Evidence
- Automatic Voltage Control Schemes — Coordinated Tap And Regulator Action
- Customer Interruption Indices Per Feeder — Reinforcement Priority Input

## Day 9: Ranking and Costing Schemes

- Scheme Cost Estimation Sheets — Unit Rates And Contingency
- Option Appraisal Matrix — Technical And Cost Comparison
- Deferral Value Calculation — Timing Benefit Of Interim Measures
- Outage And Construction Sequencing — Customer Impact During Works
- Investment Committee Submission Format — Approval Evidence

## Day 10: Practising the Network Reinforcement Plan

- Feeder Group Demand Forecast Application — Plan Load Basis
- Headroom And Thermal Study Application — Constraint List
- Voltage Regulation And Protection Checks — Preferred Scheme Validation
- Peer Challenge Of Scheme Ranking — Assumption Testing
- Network Reinforcement Plan Completion — Ranked And Costed Upgrades

## Applying Distribution Reinforcement and Voltage Control After the Course

- Run a time series load flow on the three most loaded feeders and publish their voltage headroom maps to connection assessors.
- Review tap changer control bands and line drop compensation at one primary substation against measured feeder end voltages.

## Distribution Reinforcement and Voltage Control Questions FAQ

### What is distribution reinforcement and voltage control, and why does it matter now?

It is the planning of capacity upgrades and voltage support on medium and low voltage networks. It matters now because electric vehicles, heat pumps and rooftop solar are changing feeder loading faster than past forecasts assumed, so headroom must be measured and managed deliberately.

### Which roles gain most from distribution reinforcement and voltage control?

Load study engineers, low voltage design planners, connection assessors and asset investment engineers gain most. Each makes part of the reinforcement decision, and you see how your piece fits the voltage case, the protection check and the capital ranking.

### How does distribution reinforcement and voltage control differ from a course on network losses and reliability?

It focuses on capacity and voltage: where demand will exceed thermal or voltage limits and which upgrade fixes it. A losses and reliability course instead targets energy lost along the supply chain and interruption performance, treating capacity as a given.

### What do you bring back from distribution reinforcement and voltage control?

You bring back a ranked, costed set of feeder upgrades with voltage and protection checks for a feeder group. You also bring repeatable study cases and headroom maps your planning colleagues can reuse for new connection requests.

## Distribution Reinforcement and Voltage Control: The Way Forward

The network reinforcement plan sets out which feeders need upgrading, in what order and at what cost. Its first use is to decide which schemes enter the next capital round, read by planners, connection assessors and the investment committee. After its first cycle, revisit the demand forecast against measured feeder loading, since electrification uptake rarely follows the original curve.