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COURSE BROCHURE

# Advanced Uninterruptible Power Supply Reliability Training Course

11 – 22 July 2027
Dubai

# Advanced Uninterruptible Power Supply Reliability Training Course

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Uninterruptible Power Supply Reliability is a 2-week training course for electrical maintenance and critical power engineers who keep protected loads running through mains disturbances, component ageing and maintenance outages, and who prepare a critical power reliability review for their site. Hospitals, data halls and process plants depend on continuous supply, and one unnoticed weak component can stop operations. Jupiter Prime Training presents Uninterruptible Power Supply Reliability through failure evidence, redundancy choices and maintenance decisions.

## Why Uninterruptible Power Supply Reliability Matters Now

Three forces are reshaping how critical power is kept dependable. Loads are denser and less tolerant of transfer events. Battery chemistry is shifting from valve-regulated lead-acid towards lithium-ion. Maintenance teams are also smaller, so condition-based decisions must replace fixed calendars. An organisation that reads failure evidence well avoids unplanned outages; one relying on nameplate redundancy finds hidden weak points only when the load drops. The course rests on failure mode and effects analysis, reliability block modelling and condition monitoring practice.

## Who Gains Most from Uninterruptible Power Supply Reliability

- Engineers responsible for preventive and corrective maintenance of rectifiers, inverters and static bypass units
- Specialists who own battery string health, discharge testing and replacement planning
- Critical facility engineers accountable for load transfer, redundancy and maintainability of protected supplies
- Reliability engineers who analyse outage records and recommend design or maintenance changes
- Electrical leads who approve switching procedures and isolation for live critical power systems

Site teams combining maintenance, battery and facility engineers gain most when they attend together.

## Uninterruptible Power Supply Reliability Capabilities

Participants learn to trace each outage back to the component, ageing mechanism or switching error behind it.

- Assess rectifier, inverter and static switch failure modes from alarm logs and test readings — repair or replace decisions
- Calculate system availability for single, parallel redundant and dual-bus arrangements — investment cases for redundancy upgrades
- Test battery strings through impedance trending and capacity discharge — replacement timing for battery owners
- Design maintenance bypass and isolation sequences that keep the load protected — switching authorisation by electrical leads
- Specify condition monitoring points and alarm thresholds — remote supervision by facility operators
- Communicate reliability findings and residual risks — site management and load owners

## Key Uninterruptible Power Supply Reliability Terms

- Double-conversion topology — an arrangement where the load is always fed by the inverter from a rectified direct-current bus.
- Static bypass switch — a thyristor-based path that transfers the load to an alternate source within milliseconds when the inverter cannot carry it.
- Single point of failure — any component or connection whose loss alone interrupts supply to the protected load.
- Float charge — the constant low voltage a charger holds across a battery string to keep it fully charged without overcharging.
- Mean time between failures — the average operating time between failures of a repairable item, used in availability calculations.
- Internal ohmic measurement — a test of cell impedance, resistance or conductance whose upward trend signals ageing or connection faults.

## Uninterruptible Power Supply Reliability Day by Day

## Day 1: Critical Load Context and Outage Consequences

- Critical Load Classification — Which Loads Justify Higher Supply Availability
- Outage Cost Mapping — Consequence Ranking Across Healthcare and Process Sites
- Mains Disturbance Profiles — Protection Needs Against Sags, Swells and Interruptions
- Historical Outage Record Review — Patterns Behind Past Critical Supply Losses
- Reliability Target Setting — Agreed Availability Goals With Load Owners

## Day 2: Topologies and Their Weak Points

- Double-Conversion, Line-Interactive and Standby Comparison — Topology Fit for Load Sensitivity
- Modular Versus Monolithic Architecture — Repair Time and Spare Module Strategy
- Transformer-Based and Transformerless Designs — Fault Behaviour and Isolation Trade-Offs
- Single Point of Failure Tracing — Hidden Common Elements in Redundant Designs
- Topology Single-Line Walkdown — Gaps Between Drawings and Installed Systems

## Day 3: Rectifier and Inverter Failure Behaviour

- Rectifier Input Stage Faults — Harmonic Stress and Power Semiconductor Ageing
- Inverter Bridge Failure Mechanisms — Thermal Cycling and Gate Drive Faults
- Direct-Current Capacitor Wear — Replacement Intervals Based on Ripple and Temperature
- Cooling Fan and Airflow Degradation — Early Warning From Temperature Trends
- Alarm and Event Log Interpretation — Root Cause of Inverter Shutdowns

## Day 4: Static Switch, Bypass and Transfer Integrity

- Static Bypass Transfer Logic — Synchronisation Conditions and Transfer Inhibits
- Maintenance Bypass Switching Sequences — Avoiding Load Drops During Isolation
- Backfeed Protection Checks — Safety of Staff Working Upstream
- Downstream Fault Clearing Coordination — Breaker Selectivity on Inverter Current Limit
- Transfer Event Records — Diagnosing Unexpected Bypass Operations

## Day 5: Battery Chargers and Charging Regimes

- Charger Operating Modes — Float, Boost and Equalise Selection by Chemistry
- Temperature-Compensated Charging — Limiting Thermal Runaway and Dry-Out
- Charger Ripple and Regulation Testing — Hidden Causes of Shortened Battery Life
- Recharge Time After Discharge — Exposure to a Second Mains Failure
- Charger Redundancy and Isolation — Keeping Battery Support During Charger Repair

## Day 6: Battery Health, Testing and Replacement Decisions

- Valve-Regulated Lead-Acid Ageing Mechanisms — Grid Corrosion and Electrolyte Loss
- Lithium-Ion Battery Management Supervision — Cell Balancing and Protective Disconnects
- Internal Ohmic Trending — Flagging Weak Cells Between Discharge Tests
- Capacity Discharge Testing — Verifying Remaining Autonomy Against Load Demand
- End-of-Life Criteria — Whole-String Versus Cell Replacement Choices

## Day 7: Redundancy Schemes and Availability Modelling

- Parallel Redundant Configurations — Load Sharing Limits and Capacity Margins
- Dual-Bus and Distributed Redundancy — Static Transfer Switch Placement
- Reliability Block Diagrams — Availability Comparison of Candidate Arrangements
- Mean Time Between Failures and Repair Data — Credibility of Supplier Figures
- Common Cause Failure Review — Shared Batteries, Controls and Cooling

## Day 8: Failure Mode Analysis and Maintenance Strategy

- Failure Mode and Effects Analysis — Ranking Critical Supply Failure Modes
- Condition-Based Versus Calendar Maintenance — Interval Choices per Component
- Thermographic Inspection — Loose Connections and Overloaded Busbars
- Spares and Repair Time Planning — Holding Stock for Long-Lead Modules
- Maintenance-Induced Failure Prevention — Method Statements for Live Critical Systems

## Day 9: Monitoring, Alarms and Performance Evidence

- Remote Monitoring Point Selection — Signals That Predict Failure Early
- Alarm Threshold Setting — Reducing Nuisance Alarms Without Missing Warnings
- Load and Efficiency Trending — Capacity Headroom and Energy Loss Decisions
- Generator and Critical Supply Interaction — Walk-In and Frequency Tolerance Checks
- Reliability Indicator Dashboards — Reporting Supply Health to Site Management

## Day 10: Practising the Critical Power Reliability Review

- Single-Line Weak Point Mapping — Applying Topology and Bypass Findings
- Battery and Charger Condition Summary — Applying Testing and Charging Evidence
- Availability Model of Current Arrangement — Applying Redundancy Calculations
- Prioritised Maintenance and Upgrade Actions — Applying Failure Mode Rankings
- Critical Power Reliability Review — Findings and Actions for Load Owners

## Applying Uninterruptible Power Supply Reliability After the Course

- Lead a failure mode and effects analysis of one critical supply system, ranking its failure modes and tracing every single point of failure on the installed single-line diagram.
- Set up internal ohmic trending and a capacity discharge test schedule for each battery string, with replacement criteria agreed with the battery owner.

## Uninterruptible Power Supply Reliability Questions FAQ

### What is Uninterruptible Power Supply Reliability and why does it matter now?

Uninterruptible Power Supply Reliability is the discipline of keeping protected loads supplied through component failures, ageing and maintenance. It matters now because loads are denser, battery chemistries are changing and maintenance teams are smaller.

### Which roles gain most from Uninterruptible Power Supply Reliability training?

Maintenance and critical power engineers gain most. That includes those who service rectifiers and inverters, own battery strings, approve bypass switching or analyse outage records.

## How does an Uninterruptible Power Supply Reliability course differ from a sizing and commissioning course?

It focuses on systems already in service rather than new installations. A sizing and commissioning course proves a new system works; this course examines failure modes, redundancy, battery ageing and maintenance strategy over the life of existing supplies.

## What do you bring back from Uninterruptible Power Supply Reliability training?

You bring back a structured reliability review of your own critical supply. It maps weak points, summarises battery condition, models availability and ranks actions.

## Uninterruptible Power Supply Reliability: The Way Forward

The critical power reliability review gives site management a ranked list of weak points and actions. Its first decision is usually where redundancy or battery replacement funds go next. Maintenance engineers use it to set inspection and testing intervals, and load owners use it to judge residual risk. After its first use, revisit the availability model once new outage and test records accumulate.