UPS Training Course: Topology, Battery Life, Charger Duty and Critical Power Resilience Decisions

21 – 25 June 2027
Barcelona

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Programme Summary

UPS selection, battery life and charger duty for critical loads are the subject of this one-week training course for electrical engineering, facilities and plant reliability leaders, ending in a critical power resilience plan for one site. A short supply loss can stop a control room, data hall or process line, yet UPS and battery decisions are often made on supplier data and left unreviewed until a failure. The programme moves from load criticality to UPS topology, battery sizing, charger duty and lifecycle renewal, using prepared site data. Mars Training Centre UK delivers this programme on UPS systems and battery chargers to mixed-organisation cohorts.

The Business Case

Plants, utilities, hospitals and data facilities rely on stored energy to ride through supply loss and to keep protection and control alive. Leaders who can read what a UPS and its batteries can really deliver, and when they are likely to fail, avoid both over-spending on redundancy and under-protecting loads that cannot stop.

- Critical Load Loss: Falls when topology, redundancy and bypass choices match the load that must not stop.
- Battery Lifecycle Cost: Improves when sizing, test results and replacement timing are planned together.
- Maintenance Surprise: Decreases when failure modes are ranked and checks are set to find them early.

Principles and Evidence Base

- Online Double-Conversion Topology: A UPS design that continuously rebuilds the supply through a rectifier and inverter, applied in Session 2 to compare protection levels.
- Line-Interactive and Offline Topologies: Lower-cost UPS designs with different transfer behaviour, applied in Session 2 to test fit with each load.
- Float and Boost Charging: Charger modes that hold and restore battery charge, applied in Session 4 to review charger duty.
- Valve-Regulated Lead-Acid, Vented Lead-Acid and Lithium-Ion Batteries: The main battery types, applied in Session 3 to size autonomy time and compare ageing.

Intended Participants

- Electrical engineering managers who specify and approve UPS and DC systems.
- Plant reliability leaders who own the risk of critical load loss.
- Facilities managers who run standby power for control rooms and data areas.
- Asset managers who plan battery renewal and spares budgets.
- Project engineers who review supplier designs and acceptance tests.

Typical settings include process plants, power utilities, hospitals and data facilities.

Learning Outcomes

1. Participants will be able to prioritise loads by criticality and required autonomy time.
2. Participants will be able to compare UPS topologies and redundancy layouts for a given load.
3. Participants will be able to evaluate battery sizing and the effect of battery type on ageing.
4. Participants will be able to diagnose charger duty problems and failure modes in UPS and DC systems.
5. Participants will be able to justify a maintenance, testing and battery replacement plan to a budget holder.

Programme Structure

Day 1: UPS Systems and Critical Load Foundations

Which loads must never lose supply, and for how long?

- Critical Load Register
- Supply Loss Impact Table
- Autonomy Time Requirement Sheet
- UPS and DC System Block Map
- Resilience Gap List

Day 2: UPS Topology and Redundancy

Which UPS design and layout protect each load at reasonable cost?

- Offline and Line-Interactive Comparison
- Online Double-Conversion Review
- Static Bypass and Maintenance Bypass Paths
- Parallel and Redundant Layout Options
- Harmonics and Load Compatibility Check

Day 3: Battery Types and Sizing

How long will the batteries really carry the load?

- Battery Type Comparison Table
- Autonomy Time Calculation
- Ageing and Temperature Derating Sheet
- Battery Bank Layout Review
- Battery Test Result Reading

Day 4: Battery Chargers and DC Systems

Is the charger holding and restoring the battery as intended?

- Float Charge Setting Review
- Boost Charge Recovery Case
- Charger Rating and Duty Check
- Substation and Plant DC System Layout
- Charger Failure Mode Table

Day 5: Critical Power Resilience Plan for One Site

Do the findings join into a plan a budget holder can approve?

- Applying the Session 1 Critical Load Register
- Testing the Session 2 Redundancy Options
- Applying the Session 3 Battery Test Result Reading
- Comparing the Session 4 Charger Failure Mode Table
- Completing the Critical Power Resilience Plan

Methodology

The programme is a data workshop built on prepared one-line diagrams, load lists and battery test records for two sites, one industrial plant and one data facility. Participants rank loads, compare designs, size batteries, review charger settings and defend a renewal plan to peers acting as an investment committee.

- Suggested activity: Calculating autonomy time for a battery bank after ageing and temperature derating.
- Suggested activity: Choosing between a single and a parallel redundant UPS for a control room.
- Suggested activity: Reading a set of battery test results to rank cells or strings for replacement.

Capstone Output

Each participant completes a critical power resilience plan for one site. It holds a load register, a topology and redundancy choice, a battery sizing and autonomy sheet, a charger review, a failure mode table and a replacement schedule. At work it goes to the budget holder and sets the review routine for later renewals.

Frequently Asked Questions

Is UPS systems and battery chargers training suitable for leaders who are not power electronics specialists?

Yes. UPS systems and battery chargers are taught through prepared site data and templates. You need responsibility for electrical engineering, facilities or plant reliability, but no earlier design experience.

Which designs and methods does UPS systems and battery chargers training rest on?

UPS systems and battery chargers training rests on online double-conversion, line-interactive and offline topologies, float and boost charging, and the main battery types, compared on one resilience plan.

How is the plan from UPS systems and battery chargers training used at work?

You present the resilience plan to your budget holder, use its autonomy sheet and replacement schedule to justify spending, and keep its failure mode table as the check list for later reviews.

How do UPS systems differ from a programme on generator and switchgear management?

UPS systems concentrate on stored-energy ride-through, batteries and chargers for critical loads, while a programme on generator and switchgear management concentrates on prime movers, breakers and distribution assets.