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COURSE BROCHURE

# Power Transformer Condition Assessment and Life Extension Training Course

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Registered in the United Kingdom and Saudi Arabia

# Power Transformer Condition Assessment and Life Extension Training Course

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Power Transformer Condition Assessment and Life Extension is a 1-week training course for transformer engineers, substation maintenance engineers and asset managers who must decide whether an ageing unit is repaired, refurbished, derated or replaced, and who leave with a transformer condition and life extension plan. Large transformers are costly and slow to procure, so each assessment decision carries real weight. Jupiter Prime Training delivers this course on Power Transformer Condition Assessment and Life Extension.

## Why Power Transformer Condition Assessment Matters Now

Three forces shape transformer condition assessment today. Fleets installed decades ago are reaching design life together, while new units carry long lead times. Electrification is pushing older units through hotter, more variable duty. Experienced test specialists are retiring. An organisation that reads its test evidence well extends service safely and phases replacements; one that reads it badly risks failure, fire and rushed purchasing.

## Who Gains Most from Power Transformer Condition Assessment

- Engineers who plan and witness diagnostic tests on units in service
- Maintenance specialists who carry out oil treatment and bushing repairs
- Asset owners who rank fleet risk and set replacement budgets
- Operations staff who set loading limits and outage windows
- Reliability specialists who investigate transformer incidents

The greatest gain comes when a substation maintenance group sends its test engineers and its asset planners together.

## Power Transformer Condition Assessment Capabilities

Participants move from single test readings to a defensible view of each unit's health and remaining service.

- Specify a diagnostic test set matched to unit age, duty and known defects — test engineers and outage planners
- Interpret insulation, winding and bushing results against baseline and trend — maintenance engineers
- Assess oil condition and paper ageing as evidence of remaining insulation life — asset owners
- Calculate a health index that ranks units across a fleet — investment committees
- Weigh repair, refurbishment, derating and replacement options on risk and cost — senior engineering managers
- Build a condition and life extension plan with inspection intervals and triggers — operations and finance leaders

## Key Power Transformer Condition Assessment Terms

- Health index — a single score combining test, inspection and service history to rank units across a fleet.
- Degree of polymerisation — a measure of cellulose chain length in winding paper; lower values signal aged, weaker insulation.
- Power factor test — a measurement of insulation dielectric losses that reveals moisture or contamination.
- Frequency response analysis — a comparison of a winding's response across frequencies to reveal mechanical movement or deformation after faults.
- Hot spot temperature — the highest temperature inside the winding, which drives the rate of insulation ageing under load.
- Remaining life estimate — a reasoned judgement of the safe service period left, based on insulation condition, loading and defects.

## Power Transformer Condition Assessment Day by Day

### Day 1: Ageing Mechanisms and Fleet Risk

- Thermal, Moisture and Oxygen Ageing of Paper — Which Units Age Fastest
- Failure Modes of Windings, Cores, Bushings and Tap Changers — Inspection Priorities
- Service History and Loading Records — Evidence Gaps Before Testing
- Criticality Ranking by Network Position — Where Failure Costs Most
- Baseline and Factory Test Records — Reference Values for Later Comparison

### Day 2: Electrical Diagnostic Tests

- Insulation Resistance and Polarisation Index — Moisture and Surface Contamination Checks
- Power Factor and Capacitance Testing — Bushing and Winding Insulation Health
- Winding Resistance and Turns Ratio — Contact, Connection and Turn Faults
- Frequency Response Analysis — Mechanical Winding Movement After Through Faults
- Excitation Current and Leakage Reactance — Core and Winding Geometry Changes

### Day 3: Oil, Paper and Thermal Evidence

- Oil Moisture, Acidity and Breakdown Voltage — Oil Treatment or Replacement Choice
- Furan Compounds and Paper Polymerisation — Remaining Insulation Strength
- Thermal Imaging of Tanks, Radiators and Bushings — Cooling and Connection Defects
- Hot Spot and Loading Calculations — Safe Overload Limits for Aged Units
- Online Monitoring Sensors and Alarms — When Continuous Data Justifies Its Cost

### Day 4: From Results to Life Extension Decisions

- Health Index Scoring and Weighting — Fleet Ranking for Investment Rounds
- Drying Out, Oil Regeneration and Gasket Renewal — Years of Service Gained
- Bushing and Cooling System Replacement — Targeted Refurbishment Value
- Derating and Loading Restrictions — Risk Accepted Versus Outage Avoided
- Repair, Rewind or Replace Cost Comparison — Long Lead Time Planning

## Day 5: Practising the Transformer Condition and Life Extension Plan

- Case Unit Test Set Interpretation — Applying Electrical and Oil Evidence Together
- Health Index Calculation for a Sample Fleet — Ranking Units for Action
- Life Extension Option Appraisal — Choosing Interventions for Two Critical Units
- Inspection Intervals and Decision Triggers — Rules for Retest and Escalation
- Transformer Condition and Life Extension Plan — Final Plan Presented for Challenge

## Applying Power Transformer Condition Assessment After the Course

- Score the five most critical transformers on site with the health index method and present the ranking to the maintenance planning meeting.
- Review the latest oil and power factor results for one ageing unit against its baseline and agree a retest interval and intervention trigger.

## Power Transformer Condition Assessment Questions FAQ

### What is power transformer condition assessment and why does it matter now?

Power transformer condition assessment is the reading of electrical, oil and thermal evidence to judge a unit's health and remaining life. It matters now because many fleets are ageing together, loading is rising and replacement units take a long time to obtain.

### Which roles gain most from power transformer condition assessment?

Test engineers, substation maintenance engineers and asset owners gain most. Operations staff also benefit when setting loading limits for older units.

### How does power transformer condition assessment differ from a transformer specification course?

Power transformer condition assessment deals with units already in service: testing, interpreting results and extending life. A specification course deals with choosing and buying new units.

### What do you bring back from power transformer condition assessment?

You bring back a transformer condition and life extension plan for real or sample units. It ranks units by health and sets retest triggers and interventions.

## Power Transformer Condition Assessment: The Way Forward

The transformer condition and life extension plan first informs which units receive refurbishment money and which move onto the replacement list. Maintenance engineers use it to schedule retests, and asset owners use it to phase purchasing around long lead times. After its first use, revisit the health index weighting as service experience shows which results predict deterioration.