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COURSE BROCHURE

Advanced Concrete Repair Materials and Strengthening Training Course

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Registered in the United Kingdom and Saudi Arabia

Advanced Concrete Repair Materials and Strengthening Training Course

Concrete Repair Materials and Strengthening is a 2-week advanced training course for concrete repair engineers, materials specialists and asset maintenance managers, who leave with a Concrete Repair and Strengthening Specification for a deteriorated structure. Ageing bridges, jetties, process plants and car parks now face chloride attack, carbonation and overloading, and repairs that fail within a few years cost more than the original work. Jupiter Prime Training offers this course on concrete repair materials and strengthening.

Why Concrete Repair Materials and Strengthening Matter Now

Three forces shape concrete repair today: ageing infrastructure built for lighter loads and milder exposure, owners demanding longer service lives from every intervention, and a widening range of proprietary mortars, resins, composites and coatings whose datasheets are hard to compare. An organisation that diagnoses the cause, matches material to substrate and verifies application extends service life at predictable cost; one that patches symptoms sees incipient anodes, debonding and cracking return. The course rests on established repair principles and methods, the American Concrete Institute building code ACI 318 for structural checks, and condition assessment practice.

Who Gains Most from Concrete Repair Materials and Strengthening

- Engineers who investigate damaged concrete and decide between patch repair, overlay, cathodic protection or replacement
- Materials specialists who compare mortars, grouts, resins and coatings and approve submittals
- Asset maintenance leads who plan intervention cycles for bridges, wharves, tanks and plant structures
- Repair contractors' technical leads who set surface preparation, curing and testing on site
- Inspection and testing staff who run cover surveys, half-cell mapping and pull-off tests

An owner's asset team that sends its maintenance lead, a materials specialist and a site inspector together gains most, because diagnosis, specification and site verification then follow one logic.

Concrete Repair Materials and Strengthening Capabilities

Participants move from reading product datasheets to choosing repair and strengthening systems that are compatible with the parent concrete and the exposure.

- Diagnose deterioration mechanisms from cover, carbonation, chloride and crack evidence — informing repair strategy selection
- Specify compatible repair mortars by modulus, shrinkage, thermal expansion and bond — protecting long-term repair performance
- Select corrosion protection options from inhibitors to cathodic systems — guiding asset owners' life-cycle choices
- Design externally bonded fibre-reinforced polymer strengthening with debonding checks — serving structural reviewers
- Build surface preparation, application and curing method statements — directing repair contractors
- Test completed repairs with pull-off, hammer sounding and cores — supporting acceptance by owners

Key Concrete Repair Materials and Strengthening Terms

- Carbonation — the reaction of atmospheric carbon dioxide with cement hydrates that lowers concrete alkalinity and allows reinforcement to corrode.
- Chloride Threshold — the chloride concentration at the steel surface above which passive protection breaks down and pitting corrosion starts.
- Polymer-Modified Mortar — a cementitious repair mortar containing polymer additions that improve bond, flexibility and resistance to water and chlorides.
- Incipient Anode — accelerated corrosion that develops beside a new patch repair because of the potential difference between repaired and unrepaired concrete.
- Fibre-Reinforced Polymer FRP — carbon, glass or aramid fibres in a resin matrix, bonded to concrete to add flexural, shear or confining strength.
- Dimensional Compatibility — the match of shrinkage, modulus and thermal movement between repair material and substrate that prevents cracking and debonding.

Concrete Repair Materials and Strengthening Day by Day

Day 1: Deterioration Mechanisms and Repair Context

- Reinforcement Corrosion From Carbonation and Chlorides — Diagnosing the Root Cause
- Sulphate Attack and Alkali-Silica Reaction — Recognising Chemical Damage Patterns
- Freeze-Thaw, Abrasion and Thermal Cracking — Separating Physical Damage
- Marine Jetty and Process Plant Case Histories — Learning From Repeat Failures
- Service Life Thinking — Framing Repair Against Remaining Design Life

Day 2: Condition Assessment and Testing

- Visual Survey and Defect Mapping — Recording Spalls, Cracks and Stains
- Cover Meter and Carbonation Depth Tests — Locating At-Risk Reinforcement
- Half-Cell Potential and Resistivity Mapping — Ranking Corrosion Activity
- Chloride Profiles and Core Testing — Confirming Contamination and Strength
- Condition Assessment Report — Converting Test Data Into Repair Zones

Day 3: Repair Strategy and Material Selection

- Repair Principles and Methods — Matching Options to Each Damage Cause
- Patch Repair Versus Overlay Versus Replacement — Weighing Life-Cycle Cost
- Material Property Datasheets — Comparing Modulus, Shrinkage and Bond
- Exposure Classes and Durability Needs — Setting Performance Requirements
- Repair Strategy Matrix — Choosing Systems for Each Zone

Day 4: Cementitious and Polymer Repair Mortars

- Polymer-Modified and Shrinkage-Compensated Mortars — Selecting by Thickness and Exposure
- Sprayed Concrete for Large Areas — Deciding Wet or Dry Process
- Flowable Micro-Concrete and Formwork Repairs — Filling Congested Sections
- Epoxy Mortars and Bonding Agents — Limiting Use to Suitable Cases
- Trial Panels and Mock-Ups — Proving Materials Before Full Application

Day 5: Crack Repair and Injection

- Crack Movement Monitoring — Distinguishing Live From Dormant Cracks
- Epoxy Resin Injection — Restoring Structural Continuity
- Polyurethane Injection — Sealing Water-Bearing Cracks
- Routing and Sealing — Treating Surface Cracks Economically
- Injection Records and Core Checks — Verifying Penetration and Fill

Day 6: Corrosion Protection Systems

- Migrating Corrosion Inhibitors — Slowing Corrosion Without Breaking Out Concrete
- Galvanic Anodes in Patch Repairs — Preventing Incipient Anode Damage
- Impressed Current Cathodic Protection — Protecting Heavily Contaminated Structures
- Electrochemical Chloride Extraction and Realkalisation — Restoring Passivity
- Corrosion Protection Option Appraisal — Balancing Cost, Life and Monitoring

Day 7: Surface Protection and Coatings

- Hydrophobic Impregnations — Reducing Water and Chloride Ingress
- Anti-Carbonation and Elastomeric Coatings — Bridging Fine Cracks
- Chemical-Resistant Linings for Tanks and Bunds — Resisting Aggressive Media
- Waterproofing Membranes for Decks and Basements — Stopping Water Paths
- Coating Adhesion and Thickness Tests — Accepting Protective Layers

Day 8: Structural Strengthening With FRP and Steel

- Externally Bonded Carbon FRP Laminates — Adding Flexural Capacity
- FRP Wrapping of Columns — Increasing Confinement and Axial Strength
- Near-Surface Mounted Bars — Strengthening Where Surfaces Are Exposed
- Steel Plate Bonding and Concrete Jacketing — Comparing Traditional Options
- Debonding, Fire and Long-Term Creep Checks — Limiting Strengthening Risks

Day 9: Application Quality and Site Control

- Hydrodemolition and Breaking Out — Removing Unsound Concrete Without Damage
- Surface Preparation and Profile Grading — Securing Repair Bond
- Steel Cleaning and Priming — Treating Exposed Reinforcement
- Curing Regimes in Hot and Windy Climates — Preventing Plastic Shrinkage
- Pull-Off and Hammer Sounding Tests — Accepting Completed Repairs

Day 10: Practising the Concrete Repair and Strengthening Specification

- Diagnosis Exercise — Applying Test Data to a Damaged Jetty Deck
- Material Selection Challenge — Matching Mortars and Coatings to Exposure
- Strengthening Calculation Review — Checking an FRP Beam Retrofit
- Peer Review of Method Statements — Testing Preparation and Curing Controls
- Concrete Repair and Strengthening Specification — Completing Materials, Methods and Acceptance Tests

Applying Concrete Repair Materials and Strengthening After the Course

- Commission a half-cell and chloride survey on one deteriorating structure and use the results to define repair zones.
- Audit an existing repair specification against dimensional compatibility and curing requirements, then revise the material schedule.

Concrete Repair Materials and Strengthening Questions FAQ

What are concrete repair materials and strengthening, and why do they matter now?

They are the mortars, resins, coatings, composites and protection systems used to restore and upgrade damaged concrete. They matter now because ageing structures face harsher exposure and heavier loads, and poorly chosen repairs fail quickly and expensively.

Which roles gain most from concrete repair materials and strengthening training?

Repair engineers, materials specialists and asset maintenance managers gain most. They diagnose damage, approve repair products and plan interventions, so compatibility, corrosion protection and site testing shape their daily decisions.

How does concrete repair materials and strengthening differ from a concrete technology course?

It focuses on existing, deteriorated structures rather than new construction. A concrete technology course covers mix design and durability for new placements, while this subject covers diagnosis, repair products, corrosion protection and structural strengthening.

What do you bring back from concrete repair materials and strengthening training?

You bring back a Concrete Repair and Strengthening Specification for a structure you manage. It sets out diagnosis, repair zones, materials, strengthening, application controls and acceptance tests, ready for tender or in-house work.

Concrete Repair Materials and Strengthening: The Way Forward

The Concrete Repair and Strengthening Specification first informs which repair zones need patching, protection or strengthening. Asset owners, repair engineers and contractors use it to price, sequence and accept the work. After the first repair season it is worth revisiting the corrosion protection choice, since monitoring data often shows whether inhibitors alone were enough or anodes are needed.