CONCEPT

Concrete Repair and Condition Assessment: Deterioration, NDT and Strengthening

26 – 30 September 2027
Dammam - Eastern Province five-star



Concrete Repair and Condition Assessment: Deterioration, NDT and Strengthening

Ref: 240_15350 **Date:** 26 – 30 September 2027 **Location:** Dammam - Eastern Province five-star **Fees:** 19500 SAR

Introduction:

Cracked soffits, spalling cover and rust staining on buildings, bridges, jetties and plant structures are often patched without anyone establishing why the concrete failed, so the same defects return within a few seasons. This Core Concept course builds concrete repair and condition assessment practice for existing reinforced concrete structures: diagnosing carbonation, chloride, sulphate, alkali-silica and fire damage, planning surveys and in-situ testing, selecting repair and strengthening methods and checking the finished work. Participants produce a Concrete Condition Survey and Repair Strategy Report for a structure from their own portfolio.

Course Objectives:

- Identify the deterioration mechanism behind cracking, spalling and staining on an existing reinforced concrete member from site evidence and test results
- Plan and run a visual condition survey with defect mapping, crack classification and a targeted non-destructive testing grid
- Interpret rebound hammer, ultrasonic pulse velocity, cover meter and half-cell potential readings alongside core, carbonation depth and chloride profile results
- Rate the condition and residual capacity of damaged members, including fire-affected concrete, to set repair priorities
- Select patch repair, crack injection, surface protection, cathodic protection or strengthening options against repair principles and service conditions
- Prepare a quality assurance plan and a Concrete Condition Survey and Repair Strategy Report for a structure

Target Audience:

- Civil and structural engineers who inspect existing concrete structures and specify remedial works
- Asset owners' engineers responsible for the upkeep of buildings, bridges, car parks, tanks and marine facilities
- Maintenance engineers who plan and supervise repairs on plant and utility concrete structures
- Quality assurance and quality control engineers who witness testing and accept repair work
- Site engineers in repair and specialist contracting teams who carry out breakout, injection and strengthening works

Course Outline:

Day 1: Deterioration Mechanisms and the Existing Structure Baseline

- Carbonation Front Progression and Loss of Reinforcement Passivity
- Chloride-Induced Pitting Corrosion and Loss of Bar Cross-Section
- Sulphate Attack Forms: Delayed Ettringite Formation, External Sulphate Attack and Thaumasite
- Alkali-Silica Reaction Map Cracking, Gel Exudation and ASTM C1260 and ASTM C1293 Reactivity Tests
- Structure Baseline File: As-Built Drawings, Exposure History and Previous Repair Records

Day 2: Visual Condition Surveys and Non-Destructive Testing

- Visual Condition Survey Protocol and Defect Mapping on Elevation Drawings
- Crack Classification by Width, Pattern and Activity Using Comparator Cards and Tell-Tales
- Rebound Hammer Surface Hardness Testing to EN 12504-2 and ASTM C805
- Ultrasonic Pulse Velocity Readings for Concrete Uniformity and Internal Voids
- Cover Meter Scanning and Half-Cell Potential Grid Mapping of Corrosion Activity

Day 3: Partial-Destructive Testing, Fire Damage and Structural Assessment

- Core Extraction Planning and Compressive Strength Interpretation
- Phenolphthalein Carbonation Depth Measurement on Cores and Breakouts
- Chloride Profile Sampling by Dust Drilling and Laboratory Analysis
- Fire-Damaged Concrete Appraisal: Colour Change Zones, Spalling and Residual Strength
- Residual Capacity Check and Condition Rating Matrix for Damaged Members

Day 4: Repair Principles, Repair Methods and Strengthening Options

- EN 1504 Repair Principles and Repair Strategy Selection Matrix
- Patch Repair Sequence: Breakout Limits, Bar Cleaning, Bonding Agents and Mortar Selection
- Epoxy and Polyurethane Crack Injection and Protective Surface Coating Systems
- Cathodic Protection and Migrating Corrosion Inhibitors for Existing Concrete at Overview
- Strengthening Options: FRP Plates and Wraps, Section Jacketing and External Post-Tensioning at Overview

Day 5: Inspection Walkthrough and the Condition Survey Report

- Inspection Walkthrough: Marine Jetty Deck and Multi-Storey Car Park Defect Case Files
- Test Data Interpretation Exercise: Combined Half-Cell, Cover and Chloride Results
- Repair Quality Assurance Plan Build: Hold Points, Pull-Off Bond Tests and Hammer Sounding
- Concrete Condition Survey and Repair Strategy Report Drafting
- Report Presentation and Peer Challenge Panel

Skills You Will Gain:

- Deterioration Mechanism Diagnosis
- Defect Mapping
- In-Situ Concrete Testing
- Corrosion Activity Assessment
- Residual Capacity Rating
- Repair Method Selection
- Strengthening Option Appraisal
- Repair Acceptance Testing

Why Attend This Course:

- Return with a Concrete Condition Survey and Repair Strategy Report built for a structure you are responsible for
- Stop repeat repairs by treating the cause of deterioration rather than only the visible spalling
- Spend testing budgets on the locations and methods that answer the repair question
- Compare repair practice with engineers from building, bridge, marine, industrial and utility portfolios

Conclusion:

Durable concrete repair starts with the right diagnosis and ends with work that is tested before acceptance. The course moves from deterioration mechanisms and the structure baseline through visual surveys, non-destructive and partial-destructive testing and fire damage appraisal, to repair principles, repair methods and strengthening options. The final day applies this in an inspection walkthrough and turns the evidence into a Concrete Condition Survey and Repair Strategy Report ready for asset owner review.