

# Structural Renovation of Buildings

## INTRODUCTION

- This Structural Renovation of Buildings training course will present methods for inspection and evaluation of buildings and diagnose the reason for concrete deterioration or the corrosion of the steel bars, to develop a preventive maintenance program. The renovation of reinforced concrete structures has become common in recent years due to the development of technologies, materials, and techniques for maintenance and repair.
- The causes of structural deterioration will be discussed, concentrating on the reason for corrosion and new protection methods to the steel bars. All the repair and renovation methods will be covered theoretically and practically and discussed its advantages and disadvantages and how to use a suitable method. The case study explains practically who we can diagnosis the reason for deterioration and take the decision to repair and choose between different alternatives. Herein, the advanced material such as Carbon Fiber Reinforced Polymer (CFRP) will be illustrated for renovation and strengthening the structure in addition to the first principal of the design.

This training course will highlight:

- The new methods of structure diagnosis
- The new methods for structure renovation
- The materials that will be used in concrete structure repair
- Protection of the structure during the renovation
- The advanced material (nontraditional methods) for repairing and strengthening the structures

## OBJECTIVES

By the end of this training course, the participants will be able to:

- Understand modern and effective procedures for the renovation of the building
- Know the structural defects and cracks and diagnosis the reason for the deterioration
- Diagnose the problem and provide a repair solution
- Familiarise with up-to-date renovation methods for concrete and steel structures
- Know the nontraditional methods using advanced material for structural renovation

## **TRAINING METHODOLOGY**

- This Structural Renovation of Buildings training course will utilise a variety of proven adult learning techniques to ensure maximum understanding, comprehension, and retention of the information presented. The daily workshops will be highly interactive and participative. Videos and photos will be used for illustration.

## **ORGANISATIONAL IMPACT**

The impact on the organisation in participating this Structural Renovation of Buildings training course will be the following:

- Improve the renovation project cost
- Improve the maintenance cost and quality for RC structure
- The value cost for renovation versus project investment
- Increase the organisation investment by having a durable structure
- Quality control of commissioning the buildings by avoiding structural defects
- Developing practical solutions based on the advanced and sustainable materials which have an economic impact

## **PERSONAL IMPACT**

- Competent to assess structures
- Capable of defining the scope of the renovation
- Able to define the reasonable method of repair
- Capable of using advanced materials in the renovation
- Improving the engineering sense of understanding the meaning of cracks by practical workshops
- Updated advanced materials and methods of repairing defected structures and buildings

## **WHO SHOULD ATTEND?**

- This Structural Renovation of Buildings training course is designed for people in the field of construction industry who are involved in building maintenance and provide execution plans for maintenance and repair for buildings.

This training course will also benefit those who are involved in preparing maintenance document package, diagnose the reasons for failure, and the engineers who define and choose the methods of repair, are as follows:

- Civil Engineer
- Structural Engineer
- Architectural Engineer
- Construction Technician
- Construction Supervisors

## Course Outline

### Building Evaluation

- Introduction to Structural Principles
- Types of Structural Statically Systems
- Types of Tests Needed to Inspect the Building
- Destructive Tests Used for Evaluation
- Visual Inspection Criteria
- New Techniques to Inspect the Building
- Diagnose the Reason of Deterioration
- Evaluate the Building Risk

### Reasons of Failure Structure Corrosion

- Construction Errors
- Design Errors
- Problematic Soil Challenges and Solutions
- Fatal Mistakes in:
  - Soil Investigation
  - C. Foundation
- Corrosion Phenomena
- Corrosion and Protection of Steel Structure in Concrete
- Comparison between Different Types of Protection

### Properties of Protective Coating

- Evaluate the Current Protective Coating
- Types of Protective Coating
- Properties of Each Type
- Precautions in Using the Coating
- Define the Cracks Types

### Methods of Repairing the Cracked

- Define the Cracks Types
- Cracks in Miscellaneous Foundations
- Types of Cracks in R. C. Structures
- Comparison between Different Cracks
- Reasons for Each Type of Cracks
- Methods of Repair and Prevention for Each Type
- Materials Used to Repair the Corroded Structure
- Define the Method of Repair

## Methods of Repairing the Cracked

- Methods of Repair
- Precaution During Repair
- Selecting the Materials Repair
- Step by step Repair Procedure
- Video - Repair Methods
- Using Polymer Bonding Materials
- Types of Polymer
- Properties of These Materials

## Maintenance Strategy

- Using Hot Rolled Section for Repair
- CFRP Application
- Design and Construction of CFRP
- Using CFRP for Repair
- Using CFRP for Structure Strengthening
- Define the Consequences of Failure
- Maintenance Plan and Strategy Based Economic