



Advanced Concrete Technology

Course Introduction:

This course is designed to provide professionals in the construction and civil engineering sectors with in-depth knowledge and understanding of modern concrete technologies. As the demand for innovative and high-performance concrete solutions continues to grow, it is essential for industry practitioners to stay informed about the latest advancements in materials, design methodologies, and construction practices. This course aims to equip participants with the skills and knowledge necessary to enhance concrete performance, durability, and sustainability in various applications.

Course Objectives:

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

- Understand the fundamental principles of advanced concrete technology.
 - Explore the latest advancements in concrete materials and mix design.
 - Evaluate the impact of additives and admixtures on concrete properties.
 - Investigate innovative curing methods and their effects on concrete performance.
 - Analyze quality control measures and testing methods for concrete.
 - Examine sustainable practices and emerging trends in concrete technology.
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Who Should Attend?

This course is designed for all:

- Civil engineers and structural engineers
 - Construction managers and project managers
 - Materials scientists and concrete technologists
 - Quality control and assurance professionals
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Course Outline:

Day 1: Introduction to Advanced Concrete Technology

- **Overview of Concrete as a Construction Material**
 - Historical Development of Concrete Technology
 - Importance of Concrete in Modern Construction
- **Fundamental Properties of Concrete**

- Mechanical Properties: Strength, Elasticity, and Durability
- Thermal and Acoustic Properties of Concrete
- **Concrete Mix Design Principles**
 - Basics of Mix Design: Proportions and Ratios
 - Factors Influencing Mix Design Decisions

Day 2: Advanced Materials in Concrete

- **Cement Types and Properties**
 - Overview of Portland and Alternative Cements
 - Role of Cement in Concrete Performance
- **Additives and Admixtures**
 - Types of Chemical Admixtures: Accelerators, Retarders, and Water Reducers
 - Mineral Additives: Fly Ash, Slag, and Silica Fume
 - Impact of Additives on Fresh and Hardened Concrete Properties
- **Innovative Concrete Materials**
 - High-Performance Concrete (HPC) and Ultra-High-Performance Concrete (UHPC)
 - Fiber-Reinforced Concrete: Types

Day 3: Curing and Concrete Performance

- **Curing Methods and Their Importance**
 - Traditional vs. Innovative Curing Techniques
 - Impact of Curing Conditions on Strength Development
- **Effects of Temperature and Humidity on Curing**
 - Challenges in Extreme Weather Conditions
 - Use of Curing Compounds and Blankets
- **Long-Term Performance of Concrete**
 - Factors Affecting Durability: Environmental and Mechanical
 - Prevention of Common Concrete Failures: Cracking, Shrinkage, and Scaling

Day 4: Quality Control and Testing of Concrete

- **Quality Control Measures in Concrete Production**
 - Importance of Quality Control in Concrete Construction
 - Key Quality Control Procedures: Material Selection, Mixing, and Placement
- **Testing Methods for Concrete Properties**
 - Standard Testing Methods: Compressive Strength, Workability, and Air Content
 - Advanced Testing Techniques: Non-Destructive Testing (NDT) Methods
- **Certification and Compliance Standards**
 - Overview of Relevant Standards: ASTM, ACI, and EN
 - Ensuring Compliance with Quality Assurance Protocols

Day 5: Sustainable Practices and Emerging Trends

- **Sustainable Concrete Practices**
 - Use of Recycled Materials in Concrete Production
 - Life Cycle Assessment of Concrete Structures
- **Emerging Trends in Concrete Technology**
 - Smart Concrete: Sensors and Monitoring Systems
 - Innovations in 3D Printing with Concrete
- **Future Directions in Concrete Technology**
 - Research and Development Trends
 - The Role of Technology in Advancing Concrete Solutions

Course Methodology:

A variety of methodologies will be used during the course that including:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods

- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Fees:

To be advised as per course location. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session