

Civil Modern Concrete Technology

Training program

Introduction:

Concrete is a composite with properties that change with time. During service, the quality of concrete provided by initial curing can be improved by subsequent wetting as in the cases of foundations or water retaining structures. However, concrete can also deteriorate with time due to physical and chemical attacks. Structures are often removed when they become unsafe or uneconomical. Lack of durability has become a major concern in construction for the past 20 to 30 years. Concrete has been the most common building material for many years. It is expected to remain so in the coming decades. Concreting is widely used in domestic, rural, commercial, recreational and educational construction. Communities around the world rely on concrete as a safe, strong and simple building material.

Who Should Attend?

Construction Engineers, Senior Construction Engineers, Construction Supervisors, Construction General Supervisors, Construction Project Managers, Engineering Technologists, Supervision Engineer, Inspection Engineers, Civil Inspectors, Foremen, Design Structural Engineers, Planners, Structural Engineers, Material Specialists, Quality Control and Quality Assurance Experts, Architects, Supervision Engineers, Team Leaders, Site Officers and Managers, Mechanical Engineers, Technical Professionals, Field Production Supervisor, Operation Engineers, Clients Representatives.

Course Objectives:

By the end of this course delegates will be able to:

- Have an overview of the history and importance of the concrete industry
- Have a general knowledge of the key events in the development of the concrete industry and the products that it makes
- Have an understanding of the terminology used in the concrete industry
- Have an understanding of the types of materials used to manufacture concrete
- Have an understanding of the key steps in concrete production and supply including ordering, mixing, delivery and testing
- Have an understanding of the properties of concrete
- Have a general knowledge of the key safety and environmental
- Have an understanding of the key onsite activities including finishing, placing and curing and the effects on concrete quality

Course Outline:

Concrete Technology & New Construction Techniques & Methods

ISO and Quality in Construction

Fire, Health & Safety

Lab Work & Practices

Cementing Materials

- History
- Chemical Composition
- Manufacture
- Hydration Reactions
- Strength and Heat of Hydration of Compounds
- Types of Cements and Specifications
- Production and Specifications for Supplementary Cementing Materials

Chemical Admixtures

- Water Reducers
- Superplasticizers
- Retarders
- Accelerators
- Air Entraining Agents
- Thixotropic Agents

Aggregates

- Types and Sources of Aggregates
- Specifications
- Tests for Freezing and Thawing Resistance and Alkali Reactivity

Cement Pastes

- Hydration Reactions and Setting of Cements
- Calculation of Products and Porosity
- Models of Microstructure

Fresh Concrete Properties

- Setting, Workability
- Standard Tests
- Bleeding
- Segregation
- Hydration
- Air Entrainment
- Air Void Stability and Tests
- Influence of Air on Workability
- Protection of Fresh Concrete

Strength of Concrete

- Factors Affecting Strength Development
- Influence of Porosity
- Time
- Curing Conditions
- Aggregates

Testing Concrete

- Moisture Condition at Test
- Maturity
- Tests for Strength
- Accelerated Tests
- Cores
- Non-destructive testing
- Quality Assurance
- Acceptance and Variability of Strength

Durability of Concrete

- Permeability and Pore Structure
- Ionic Diffusion
- Chemical Attack (sulphates, acids, corrosion, leaching)
- Physical Attack (freeze-thaw, scaling, abrasion)
- Influence of Cements
- Supplementary Cementing Materials
- Aggregates
- Mix Design and Curing

Hardened Concrete Properties

- Strength
- Creep
- Shrinkage, Modulus Of Elasticity
- Water tightness (impermeability)
- Rate of Strength gain of Concrete

Batching, Mixing, Placing & Compaction of Concrete

- Batching
- Mixing of Concrete ingredients
- Placing
- Concreting
- Compaction of Concrete

Concrete Admixtures

- Accelerating admixtures
- Retarding mixtures
- Fly ash
- Air entraining admixtures
- Water reducing admixtures

Applications of Special Concrete

- Cold Weather Concreting
- Hot Weather Concreting

Concrete Mix Design

Planning and Site Preparation