

COURSE OVERVIEW SE0100
Durability of Reinforced Concrete Structures

Course Title

Durability of Reinforced Concrete Structures

Course Date/Venue

Session 1: February 25-29, 2024/The Mouna Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd - Trade Centre, Dubai, UAE

Session 2: March 03-07, 2024/Kizkulesi, Crown Plaza Istanbul Asia Hotels & Convention Center, Istanbul, Turkey



Course Reference

SE0100

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description



This practical and highly-interactive course includes practical sessions where participants will visit reinforced concrete structures. Practical sessions will be performed in order to apply the theory learnt in the class.

The Middle East construction boom will collapse without better concrete quality and corrosion protection. The service life of reinforced concrete structures is significantly lower in the Middle East than in other parts of the world due to the harsh weather conditions. There is a tendency to use a 'trial and error' approach to materials and processes which have not been standardised or fully tested as these processes are applied without supervision, which results in poor service life. Therefore, a more professional approach is needed, with special attention to the entire service life, starting from the design phase.



Collapses, premature demolitions, unforeseen extensive maintenance work all over the world created great concern about the durability and safety on the reinforced concrete structures. Engineers need therefore newer and more suitable solutions to prolong the service life of new structures, both using supplementary preventative techniques and adopting efficient maintenance and repair techniques.



The development of cost-effective strategies for maintenance of reinforced concrete structures necessitates the acquisition of reliable information on the extent and rate of damages. If the corrosion risk of the reinforcement is detected sufficiently early, damage can be avoided or reduced significantly, residual life of the structure predicted and relatively simple maintenance measures or repair systems can be used.



The course will provide updated information on diagnosis of the reinforced concrete structures at different levels, starting with a simple or low-level form of periodic visual inspections, until the use of sensors for the new and existing structures. The course therefore covers the principles of a wide range of the latest techniques and illustrates practical applications related to the use of equipments for corrosion and mechanical testing and monitoring in concrete structures on site. These modern techniques can provide rapid and sensitive measurements and detection of damages in concrete structures.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply systematic techniques, tools and procedures on reinforced concrete structures and improve the durability of such structures
- Identify the various types of damage that can affect concrete and reinforced concrete structures as well as their effects in the assessment and rehabilitation of the structures
- Determine the causes of concrete and reinforced concrete structure damage and identify the additional preventative measures being applied in concrete structures
- Implement the systematic methodology of damage assessment including the identification of service and exposure conditions of concrete structures
- Carryout assessments of corrosion affected structures and explain the assessment of the reinforced concrete structures conditions
- Explain and employ the rehabilitation of concrete structures including methods to prevent defects in concrete, rehabilitation methods against corrosion damage and determine the required properties of repair materials and systems in concrete structure
- Describe the principles and apply the methods for the rehabilitation of damaged concrete due to reinforcement corrosion
- Implement the risk-based maintenance strategy with the required repair time, required time to start of corrosion and deterioration as well as cost analysis for different protection methods

Exclusive Smart Training Kit - H-STK



*Participants of this course will receive the exclusive “Howard Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor’s actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.*

Who Should Attend


This course provides an overview of the durability of reinforced concrete structures for design engineers, inspection engineers, maintenance engineers, civil engineers, integrity engineers, construction engineers, material engineers, inspectors and other technical staff.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-


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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology’s courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant’s involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant’s CEU and PDH Transcript of Records upon request.

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Fee

Dubai	US\$ 5,500 per Delegate + VAT . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Istanbul	US\$ 6,000 per Delegate + VAT . This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Bilal Nabahani is a **Senior Civil Engineer** with almost **25 years** of practical experience in **construction of major civil engineering projects** including building, roads, bridges, airports, theatres, stadium, ports, etc. and other **energy sectors**. His expertise widely covers in the areas of **Civil Engineering, Project Relocation & Development, Site Inspection & Quality Control, Site Supervision & Management, Construction Management, Structural & Electrical Site Inspection & Quality Control, Construction Management, Earth Measurements, Earthwork & Structural Maintenance, System Safety Program Plan (SSPP) Inspection, Concrete Structure Inspection & Repair, Concrete Inspection & Maintenance, Concrete Maintenance & Reliability Analysis, Civil Engineering Design, Design and Behaviour of Steel Structures, Advanced Steel Design & Stability of Structures Concrete Structural Design, Dynamic Analysis of Rotating Equipment Foundations & Structural Steel Piperacks, Concrete Technology, Construction Planning, Construction & Concrete Works Maintenance, Seismic Design for Buildings, Advanced Building Construction Technology, Advanced Seismic & Wind Design of Reinforced Concrete, Road Pavement Design, Road Maintenance, Drainage System Operations & Maintenance, Land Surveying, AutoCAD Civil 3D, GIS & Mapping, Structural Analysis & Design (STAAD PRO), Construction Planning, Methods & Management, Sloping, Benching, Embankments, Construction Planning, Construction Quality Management, Project Risk Assessment, Project Quality Plans, Excavation, Backfill & Compaction, Excavation & Reinstatement, Excavation Safety for Construction, Groundworks Supervision, Electrical Project Utility Underground, Construction Quality Remote Sensing, Construction Materials, Construction Surveying and Detailed Engineering Drawings, Codes & Standards.**

Throughout Mr. Bilal's professional career, he has handled key positions as the **Site Manager, Project Manager, Project Supervisor, Resident Engineer, Consultant and Trainer/Instructor** for various international companies such as the Saudi Consulting, Tibah University, CKG Construction & Engineering, Almanarah Consulting, Tibah Consulting, Royal Scientific Association, MWH&CC Engineering & Consulting, Jordan Valley Authority, Graybeh Contracting, Alpha Consultant and Al Rakhaies Contracting, just to name a few.

Mr. Bilal has a **Bachelor's degree in Civil Engineering** from the **East University of North Cyprus, Turkey**. Further, he is a **Certified Trainer/Instructor** and has delivered various trainings, seminars, conferences, workshops and courses globally.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.



Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	<i>Registration & Coffee</i>
0800 – 0815	<i>Welcome & Introduction</i>
0815 – 0830	PRE-TEST
0830 – 0930	<i>Causes of Concrete & Reinforced Concrete Structures Damage</i> <i>Mechanical Causes • Physical Causes</i>
0930 – 0945	<i>Break</i>
0945 – 1100	<i>Causes of Concrete & Reinforced Concrete Structures Damage (cont'd)</i> <i>Structural Causes • Chemical Causes • Reinforcement Corrosion</i>
1100 – 1215	<i>Additional Preventative Measures</i> <i>Design for Durability</i>
1215 – 1230	<i>Break</i>
1230 – 1420	<i>Additional Preventative Measures (cont'd)</i> <i>Surface Applied Barriers • Altering the Electrochemical Behaviour</i>
1420 – 1430	Recap
1430	<i>Lunch & End of Day One</i>

Day 2

0730 – 0930	<i>Damage Assessment</i> <i>Visual Inspection • Determination of the Areas to be Investigated • Physical Tests</i>
0930 – 0945	<i>Break</i>
0945 – 1100	<i>Damage Assessment (cont'd)</i> <i>Chemical Tests • Electrochemical Tests</i>
1100 – 1215	<i>Damage Assessment (cont'd)</i> <i>Monitoring Movements</i>
1215 – 1230	<i>Break</i>
1230 – 1420	<i>Assessment of Corrosion Affected Structures</i>
1420 – 1430	Recap
1430	<i>Lunch & End of Day Two</i>





Day 3

0730 – 0930	Damage Assessment-Practical Cases
0930 – 0945	Break
0945 – 1100	Assessment of the Reinforced Concrete Structures Conditions In Situ Tests
1100 – 1230	Assessment of the Reinforced Concrete Structures Conditions (cont'd) Discussion of the Results of the Tests
1230 – 1245	Break
1245 – 1420	Principles of Rehabilitation
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4

0730 – 0930	Principles & Methods for Rehabilitation of Damaged Concrete Protection Against Aggressive Substances • Moisture Control of Concrete • Replacement of Damaged Concrete
0930 – 0945	Break
0945 – 1100	Principles & Methods for Rehabilitation of Damaged Concrete (cont'd) Strengthening of Building Components • Improvement of the Physical Resistance of Concrete • Improvement of the Chemical Resistance of Concrete
1100 – 1215	Principles & Methods for Rehabilitation of Concrete Damage Due to Reinforcement Corrosion Restauring Reinforcement Passivity • Control of Cathodic Areas of Reinforcement
1215 – 1230	Break
1230 – 1420	Principles & Methods for Rehabilitation of Concrete Damage Due to Reinforcement Corrosion (cont'd) Cathodic Protection of Reinforcement • Control of Anodic Areas of Reinforcement
1420 – 1430	Recap
1430	Lunch & End of Day Four

Day 5

0730 – 0930	Rehabilitation of Reinforced Concrete Structures Practical Case
0930 – 0945	Break
0945 – 1100	Case Study Submitted by the Participants
1100 – 1215	Risk-Based Maintenance Strategy (cont'd) Present Value Method • Repair Time • Capacity Loss in Reinforced Concrete Sections • Required Time to Start of Corrosion
1215 – 1230	Break
1230 – 1345	Risk-Based Maintenance Strategy (cont'd) Time Required to Start of Deterioration • Cost Analysis for Different Protection Methods
1345 – 1400	Course Conclusion
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course



Practical Sessions/Site Visit

Site visit will be organized during the course for delegates to practice the theory learnt: -



Course Coordinator

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