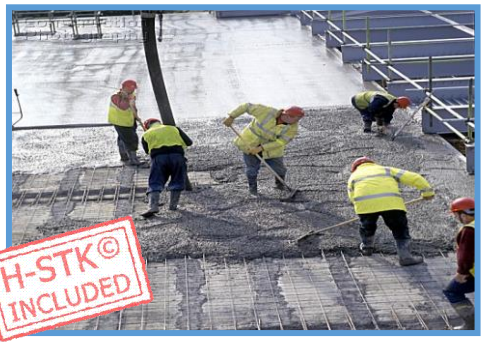
COURSE OVERVIEW SE0310-4D
Concrete Structural Design, Maintenance & Reliability Analysis for Industrial Projects & Process Facilities

Course Title

Concrete Structural Design, Maintenance & Reliability Analysis for Industrial Projects & Process Facilities



Course Reference

SE0310-4D

Course Duration/Credits

Four days/2.4 CEUs/24 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	January 08-11, 2024	Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	January 22-25, 2024	Club B Meeting Room, Ramada Plaza by Wyndham Istanbul City Center, Istanbul, Turkey
3	Febuary 19-22, 2024	Business Center, Concorde Hotel Doha, Doha, Qatar
4	March 04-07, 2024	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
5	April 15-18, 2024	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
6	July 08-11, 2024	Club B Meeting Room, Ramada Plaza by Wyndham Istanbul City Center, Istanbul, Turkey
7	October 14-17, 2024	Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA

Course Description

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

Efficient concrete structural design, maintenance and reliability analysis for industrial projects and process facilities require engineers to synthesize theories and practices. The aim of this course is to present concrete structural design, maintenance and reliability analysis in a systematic manner with the structural systems and essential subsystems including crane runways, industrial floors, reinforced concrete tanks, steel tank footing & foundation, columns, piping & pipeline support blocks and foundations & footings for rotating equipment such as compressors, pumps, generators and motors.

The course will discuss essential concepts of strength, stability, maintenance, reliability and safety of concrete structures for industrial projects and process facilities. Connections and anchorage required for assembling a safe and serviceable structure will be enumerated. The design intricacies of various structural elements associated with industrial plants will be reviewed and analyzed. Mass concrete and mat foundation designs utilized in the industrial facilities will be investigated.

The course will cover the various structural design procedures by illustrating them with numerical examples similar to those typically encountered in design offices. Structural failures, collapses, maintenance and reliability will also be discussed. The course will conclude with case studies and exchange of ideas including the application of the concepts learned during the course.

Participants will attend a unique course that covers problems and solutions involved with the design, maintenance and reliability analysis of concrete structures for industrial projects and process facilities. They will benefit from a broad range of topics covered, with procedures and real-life practical examples.

Course Objectives

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

- Apply an in-depth knowledge in the concrete structural design, maintenance and reliability analysis for industrial projects and process facilities
- Identify the different structural use of concrete and describe the various structural systems and its components
- Design reinforced concrete tanks, steel tank footings & foundations, piping & pipeline supports & anchor blocks and machinery footings & foundations
- Explain the design basis of reinforced concrete and design industrial floors and crane runways
- Design concrete columns, beam frames, foundations, equipment footings, and concrete walls
- Maintain concrete structures and employ the proper testing methods for concrete evaluation
- Review and improve the various surface repair methods used in concrete structures and identify the different techniques for the strengthening, stabilization and protection of concrete structures
- Measure the structural reliability of the existing structures and perform structural reliability assessment
- Predict the reliability of various types of structural systems, calculate the time dependent reliability and define the load and resistance effects on structural reliability
- Identify the various codes and standards applicable to structural reliability and perform probabilistic evaluation of existing structures

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward 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 all significant aspects and considerations of concrete structural design, maintenance and reliability analysis for industrial projects and process facilities for civil engineers, structural designers, consultants, architectural engineers, project engineers, structural engineers, plant engineers, facility managers, building manufactures, contractors, municipal engineers, and other regulatory agency who influence the design, location, use, maintenance and reliability of industrial facilities.

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 Fee

Abu Dubai	**US$ 4,500** 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$ 5,000** per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Doha	**US$ 5,500** per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	**US$ 4,500** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Al Khobar	**US$ 4,500** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day

Accommodation

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

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: -

- 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 **2.4 CEUs** (Continuing Education Units) or **24 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.

- 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 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. Steve Magalios, CEng, PGDip (on-going), MSc, BSc, is a **Survey & Pipeline Engineer** with almost **40 years** of extensive **On-shore/Offshore** experience in the **Oil & Gas**, **Construction**, **Refinery** and **Petrochemical** industries. His expertise widely covers in the areas of **Pipeline** Operation & Maintenance, **Pipeline** Systems, **Pipeline** Design & Construction, **Pipeline** Repair Methods, **Pipeline** Engineering, Pipeline Integrity Management System (**PIMS**), **Pipeline** Pigging, Piping & Pipe Support Systems, **Piping** Systems & Process Equipment, **Piping** System Repair & Maintenance, **Piping** Integrity Management, Computer Aided Design (**CAD**), **Building & Road** Design Skills, **Civil Engineering Design**, **Structural Reliability** Engineering, **Road** Construction & Maintenance, **Concrete Structures & Building Rehabilitation**, **Reinforced Concrete Structures Protection**, **Geosynthetics & Ground Improvement Methods**, **Blueprint** Reading & Interpretation, **Blue Print** Documentation, Mechanical **Drawings**, **P&ID**, **Flow Diagram** Symbols, **Land Surveying** & Property Evaluation, **Cartographic** Representation, Soil Classification, **Cadastral Surveying** & Boundary Definition, **Project Engineering** & Design, **Construction** Management, **Project Planning** & Execution, **Site Management**, **Site Supervision**, Effective **Resource Management**, **Project Evaluation**, **FEED** Management, **EPC Projects** Design, **Project Completion & Workover**, Quality Control and Team Management. He is also well-versed in Lean & Sour Gas, Condensate, **Compressors**, **Pumps**, Flare Knockout Drum, Block **Valve** Stations, New Slug Catcher, Natural **Gas Pipeline** & Network, Scraper Traps, Burn Pits, Risk Assessment, HSE Plan & Procedures, Quality Plan & Procedures, Safety & Compliance Management, Permit-to-Work Issuer, ASME, API, ANSI, ASTM, BS, NACE, ARAMCO & KOC Standards, MS Office tools, **AutoCAD**, **STAAD-PRO**, GIS, ArcInfo, ArcView, Autodesk Map and various programming languages such as FORTRAN, BASIC and AUTOLISP. Currently, he is the **Chartered Professional Surveyor Engineer & Urban-Regional Planner** wherein he is deeply involved in providing exact data, measurements and determining properly boundaries. He is also responsible in preparing and maintaining sketches, maps, reports and legal description of surveys.

During his career, Mr. Magalios has gained his expertise and thorough practical experience through challenging positions such as a **Project Site Construction Manager**, **Construction Site Manager**, **Project Manager**, **Deputy PMS Manager**, **Head of the Public Project Inspection Field Team**, **Technical Consultant**, **Senior Consultant**, **Consultant/Lecturer**, **Construction Team Leader**, **Lead Pipeline Engineer**, **Project Construction Lead Supervising Engineer**, **Lead Site Engineer**, **Senior Site Engineer Lead Engineer**, **Senior Site Engineer**, **R.O.W. Coordinator**, **Site Representative**, **Supervision Head** and **Contractor** for international Companies such as the Penspen International Limited, Eptista Servicios de Ingeneria S.I., J/V ILF Pantec TH. Papaioannou & Co. – Emenergy Engineering, J/V Karaylannis S.A. – Intracom Constructions S.A., Ergaz Ltd., Alkyonis 7, Palaeo Faliro, Piraeus, Elpet Valkaniki S.A., Asprofos S.A., J/V Depa S.A. just to name a few.

Mr. Magalios is a **Registered Chartered Engineer** and has **Master** and **Bachelor** degrees in **Surveying Engineering** from the **University of New Brunswick**, **Canada** and the **National Technical University of Athens**, **Greece**, respectively. Further, he is currently enrolled for **Post-graduate** in **Quality Assurance** from the **Hellenic Open University**, **Greece**. He has further obtained a Level 4B Certificates in Project Management from the National & Kapodistrian University of Athens, Greece and Environmental Auditing from the Environmental Auditors Registration Association (EARA). Moreover, he is a **Certified Instructor/Trainer**, a **Chartered Engineer** of Technical Chamber of Greece and has delivered numerous trainings, workshops, seminars, courses and conferences internationally.

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	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Industrial Projects & Process Facilities*** *Process Plants & Facilities • Oil & Gas Fields • Oil Refineries & Tank Farms • Piping & Pipeline Load & Vibration • Machinery Vibration & Load Analysis • Crane Dynamic Loads*
0930 – 0945	*Break*
0945 – 1045	***Structural Use & Design of Concrete*** *Concrete as a Structural Material • Common Forms of Concrete Structures • Primary Situations for Investigation and Design • Materials and Nature of Structural Concrete • Significant Properties of Concrete • Reinforcement • Prestressed Concrete • Design of Concrete Mixes • Special Concretes • Design Code & Specification*
1045 – 1145	***Structural Systems & Components*** *Systems with Cranes (Heavy Industrial Facilities) • Systems Without Cranes (Light Industrial/Facilities) • Reinforced Concrete Tanks • Steel Tanks Footing & Foundation • Pipeline Anchor Blocks • Essential Subsystems (Walls, Floors, Crane Runways, Columns & Foundations)*
1145 – 1245	***Design Basis of Reinforced Concrete*** *Situations for Investigation and Design • Methods of Investigation and Design • The Stress Method • The Strength Method • Investigation of Columns and Beams • Investigation of Column and Beam Frames • Approximate Investigation of Indeterminate Structures • Load and Resistance Factor Design (LRFD) • Reinforced Concrete Flexural Members • Shear in Concrete Structures*
1245 – 1300	*Break*
1300 –1420	***Design of Industrial Floors*** *Types of Floors Used in Industrial Facilities • Design Concepts, Crack Control, Joints, Form Deck, Permanent Forms, Openings, and Composite vs. Non-Composite • Design of Elevated Floors for Forklift Truck Traffic • Classification of Floors on Grade Based on Usage and Design • Use of Vapor Barrier and Reinforcing Steel • Outline Specifications • Details of Slabs on Grade*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Design of Crane Runways*** *Crane Systems Commonly used in the Industrial Facilities; Under Hung, Overhead (EOT), Yard Cranes, and Floor Mounted Jibs • Service Classifications (CMAA) and Usage • Forces Imparted by Cranes and Operational Aspects of Cranes • Crane Load Specifications • Load Combinations Involving Cranes • Design of EOT Crane Runways and Details*

0830 – 0930	***Design of Concrete Columns & Beam Frames*** *Types of Columns • Reinforcement for Columns • Combined Compression and Bending • Considerations for Column Shape • Columns in Sitecast Frames • Design Methods and Aids • Approximate Design of Tied Columns • Special Concerns for Concrete Columns • Vertical Concrete Compression Elements • Concrete Masonry Columns and Piers • Column and Beam Frames*
0930 – 0945	*Break*
0945 – 1100	***Design of Foundations & Equipment Footings*** *General Concerns for Foundations • Soil Conditions Related to Foundation Design • Foundation Design: Criteria and Process • Shallow Bearing Foundations • Equipment Footings • Column Footings • Pedestals • Foundation Walls and Grade Beams • Deep Foundation*
1100 – 1215	***Design of Concrete Walls*** *Sitecast Walls: General Concerns • Concrete Bearing Walls • Concrete Basement Walls • Concrete Shear Walls • Precast Concrete Walls • Concrete Masonry Walls*
1215 – 1230	*Break*
1230 – 1420	***Some Design Cases in Process Facilities*** *Design of Reinforced Concrete Tanks • Design of Steel Tank Footing & Foundation • Design of Piping & Pipeline Supports and Anchor Blocks • Design of Machinery Footing & Foundation*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Maintenance of Concrete Structures - General*** *Embedded Metal Corrosion • Disintegration Mechanisms • Moisture Effects • Thermal Effects • Load Effects • Faulty Workmanship: Designer, Detailer, Contractor • Concrete Evaluation*
0830 – 0930	***Maintenance of Concrete Structures – Surface Repair*** *Analysis, Strategy & Design • Material Requirements • Material Selection • Surface Preparation • Reinforcing Steel Cleaning, Repair & Protection • Bonding Repair Materials to Existing Concrete • Placement Methods*
0930 – 0945	*Break*
0945 – 1100	***Maintenance of Concrete Structures - Strengthening and Stabilization*** *Techniques/Design Considerations • Beam Shear Capacity Strengthening • Shear Transfer Strengthening Between Members • Stress Reduction Techniques • Column Strengthening*
1215 – 1230	*Break*
1230 - 1330	***Maintenance of Concrete Structures – Protrotion*** *Strategies • Methods*
1330 – 1420	***Measures of Structural Reliability*** *What is Structural Reliability? • Deterministic Measures of Limit State Violation • A Partial Probabilistic Safety Measure–the Return Period • Probabilistic Measure of Limit State Violation • Generalized Reliability Problem*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0830	***Structural Reliability Assessment*** *Uncertainties in Reliability Assessment • Integrated Risk Assessment • Criteria for Risk Acceptability • Nominal Probability of Failure • Hierarchy of Structural Reliability Measures*
0830 – 0930	***Time Dependent Reliability*** *Time-Integrated Approach • Discretized Approach • Stochastic Process Theory • Stochastic Processes and Outcrossings • Time Dependent Reliability • Load Combinations • Dynamic Analysis of Structures • Fatigue Analysis*
0930 – 0945	*Break*
0945 – 1030	***Load Effect on Structural Reliability*** *Wind Loading • Wave Loading • Floor Loading*
1030 – 1200	***Resistance Effect on Structural Reliability*** *Basic Properties of Hot-Rolled Steel Members • Properties of Steel Reinforcing Bars • Concrete Statistical Properties • Statistical Properties of Structural Members • Connections • Incorporation of Member Strength in Design*
1200 – 1215	*Break*
1215 – 1300	***Codes and Structural Reliability*** *Structural Design Codes • Improved Safety-Checking Formats • Selection of Code Safety Levels • Code Calibration Procedure • Observations*
1300 – 1345	***Probabilistic Evaluation of Existing Structures*** *Assessment Procedures • Updating Probabilistic Information • Proof and Service Load Information • Analytical Techniques • Acceptance Criteria for Existing Structures*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

Kamel Ghanem, Tel: +971 2 30 91 714, Email: kamel@haward.org