COURSE OVERVIEW SE0063
Design of Dynamic Elevated Structures

Course Title
Design of Dynamic Elevated Structures

Course Date/Venue
October 20-24, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
SE0063

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Design of Dynamic Elevated Structures. It covers the structural dynamics basics and material behavior under dynamic loads; the types of dynamic loads, modeling of dynamic systems and standards and code; the mathematical formulation of dynamics and seismic analysis of elevated structures; the wind-induced vibration analysis and wave and current load analysis; the finite element method (FEM) in dynamic design and soil-structure interaction (SSI); and the elevated structural forms, load path and structural response.

During this interactive course, participants will learn the design against seismic loads, wind and wave loads; the fatigue and fracture considerations, serviceability and deflection criteria; the dynamic response control systems, reliability in dynamic design, risk assessment and safety evaluation; the non-destructive testing (NDT) methods, structural health monitoring (SHM), sensor systems for vibration analysis and maintenance planning; the sustainability in dynamic design and design of tall towers, offshore platforms, elevated tanks and silos; and the team-based project simulation, load definition and modeling, dynamic analysis, design iteration and presentation of results.

Course Objectives

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

- Apply and gain an in-depth knowledge on design of dynamic elevated structures
- Discuss structural dynamics and material behavior under dynamic loads
- Recognize types of dynamic loads, modeling of dynamic systems and standards and code
- Analyze mathematical formulation of dynamics and apply seismic analysis of elevated structures, wind-induced vibration analysis and wave and current load analysis
- Carryout finite element method (FEM) in dynamic design and explain soil-structure interaction (SSI), elevated structural forms and load path and structural response
- Discuss design against seismic loads, design against wind and wave loads, fatigue and fracture considerations and serviceability and deflection criteria
- Recognize dynamic response control systems and apply reliability in dynamic design, risk assessment and safety evaluation
- Inspect and monitor elevated structures covering non-destructive testing (NDT) methods, structural health monitoring (SHM), sensor systems for vibration analysis and maintenance planning
- Discuss sustainability in dynamic design and describe the design of tall towers, offshore platforms, elevated tanks and silos
- Illustrate team-based project simulation, load definition and modeling, dynamic analysis, design iteration and presentation of results

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 conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of design of dynamic elevated structures for structural engineers, civil engineers, mechanical engineers, design consultants, construction engineers, project managers, regulatory and safety engineers and other technical staff.

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

Haward's certificates are accredited by the following international accreditation organizations:

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

- 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.

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 **Senior Civil Engineer** with almost **30 years** of extensive **On-shore & Offshore** experience in the **Oil & Gas**, **Construction**, **Dynamic Evaluation**, **Structural Analysis & Design** (**STAAD PRO**), **Land Surveying** & Property Evaluation, **Refinery** and **Petrochemical** industries. His expertise widely covers in the areas of **Blast** Simulation, **Blast** Resistant & Resilient Design, Building Life Assessment & Retrofit Solutions for **Blast Resistance**, **Seismicity** Modelling, **Seismic Design** for Buildings, Advanced **Seismic & Wind Design** of **Reinforced Concrete**, Industrial Building Design, **Blast Resistance & Resilient** for Oil & Gas Field, **Concrete Structures & Building Rehabilitation**, **Reinforced Concrete Structures Protection**, **Concrete** Structure Inspection & Repair, **Concrete** Inspection & Maintenance, **Concrete Maintenance & Reliability Analysis**, 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, Advanced **Building Construction** Technology, **Geosynthetics & Ground Improvement** Methods, **Bench** Design, **Benching**, **Land Survey and ArcGIS for Earthworks & Management**, **ArcGIS** for Surveying, Computer Aided Design (**CAD**), **AutoCAD Civil 3D**, **GIS & Mapping**, **Earth Measurements**, **Earthwork** & **Structural Maintenance**, System Safety Program Plan (**SSPP**) Inspection, **Building & Road** Design Skills, **Civil Engineering Design**, **Structural Reliability** Engineering, **Road** Construction & Maintenance, **Road** Pavement Design, **Road** Maintenance, **Drainage** System Operations & Maintenance, **Blueprint** Reading & Interpretation, **Blue Print** Documentation, Mechanical **Drawings**, **P&ID**, **Flow Diagram** Symbols, **Cartographic** Representation, Soil Classification, **Project Engineering** & Design, **Construction** Management, **Project Planning** & Execution, **Site Management**, **Site Supervision**, **Project Evaluation**, **FEED** Management, HSE Plan & Procedures, **Construction** Planning, Methods & Management, **Sloping**, **Embankments**, **Construction** Planning, **Construction Quality** Management, **Project Risk** Assessment, **Project Quality** Plans, **Excavation**, **Backfill & Compaction**, **Excavation & Reinstatement**, **Excavation Safety** for Construction, **Groundworks Supervision**, **Construction Quality** Remote Sensing, Construction Materials, Construction Surveying, **Detailed Engineering** Drawings, Codes & Standards 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 and software such as **SHOTPlus**, 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**, **Civil 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 a **Master's** and **Bachelor's** degree 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.

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

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.

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: Monday, 20th of October 2025

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Dynamic Elevated Structures*** *Definition & Examples (Bridges, Towers, Offshore Platforms) • Historical Evolution & Importance • Applications in Civil, Offshore & Industrial Sectors • Role of Dynamics in Design Safety*
0930 – 0945	*Break*
0945 – 1045	***Structural Dynamics Basics*** *Degrees of Freedom (SDOF, MDOF Systems) • Free versus Forced Vibration • Natural Frequency & Resonance • Damping Mechanisms in Structures*
1045 – 1145	***Material Behavior Under Dynamic Loads*** *Elastic versus Plastic Response • Fatigue Behavior of Steel & Concrete • Composite Material Performance • Influence of Temperature & Environment*
1145 – 1230	***Types of Dynamic Loads*** *Wind Loads & Gust Effects • Seismic Loads & Ground Acceleration • Wave & Current Loads (Offshore Structures) • Impact & Blast Loads*
1230 – 1245	*Break*
1245 – 1330	***Modeling of Dynamic Systems*** *Lumped Mass Models • Continuous System Representation • Modal Analysis Approach • Assumptions & Simplifications*

1330 – 1420	***Introduction to Standards & Codes*** *AISC, ACI, Eurocode, API Standards • Seismic Design Codes (IBC, UBC) • Offshore Standards (DNV, ISO) • Case Studies of Code Application*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2: Tuesday, 21st of October 2025

0730 – 0830	***Mathematical Formulation of Dynamics*** *Equation of Motion (Newton & D'Alembert) • Matrix Formulation for MDOF Systems • Damping Models (Rayleigh, Viscous, Hysteretic) • Analytical versus Numerical Solutions*
0830 – 0930	***Seismic Analysis of Elevated Structures*** *Earthquake Ground Motion Characteristics • Response Spectrum Method • Time History Analysis • Base Isolation & Damping Devices*
0930 – 0945	*Break*
0945 – 1100	***Wind-Induced Vibration Analysis*** *Aerodynamic Loading Principles • Vortex Shedding & Resonance • Gust Response Factor • Wind Tunnel Testing Applications*
1100 – 1230	***Wave & Current Load Analysis (Offshore)*** *Hydrodynamic Forces (Morison Equation) • Wave Diffraction & Reflection • Dynamic Amplification Under Cyclic Loads • Slamming & Impact Forces*
1230 – 1245	*Break*
1245 – 1330	***Finite Element Method (FEM) in Dynamic Design*** *FEM Discretization Principles • Dynamic Stiffness Matrix Formulation • Modal Superposition Method • Software Applications (ANSYS, SAP2000, STAAD.Pro)*
1330 – 1420	***Soil-Structure Interaction (SSI)*** *Foundation Dynamics • Dynamic Impedance Functions • Pile Group Response Under Vibration • Case Studies in Seismic SSI*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3: Wednesday, 22nd of October 2025

0730 – 0830	***Elevated Structural Forms*** *Towers & Chimneys • Offshore Jackets & Topsides • Elevated Storage Tanks • High-Rise Platforms & Bridges*
0830 – 0930	***Load Path & Structural Response*** *Vertical Load Distribution • Lateral Load Resisting Systems • Importance of Redundancy • Role of Bracing & Stiffness*
0930 – 0945	*Break*
0945 – 1100	***Design Against Seismic Loads*** *Ductility & Overstrength • Energy Dissipation Concepts • Seismic Detailing of Steel & Concrete • Nonlinear Pushover Analysis*

1100 – 1230	***Design Against Wind & Wave Loads*** *Dynamic Response Control • Tuned Mass Dampers • Offshore Platform Bracing Design • Floating versus Fixed Structures*
1230 – 1245	*Break*
1245 – 1330	***Fatigue & Fracture Considerations*** *Cyclic Loading Behavior • Fatigue Crack Growth Laws • Fracture Mechanics Approach • Design Strategies to Prevent Fatigue*
1330 – 1420	***Serviceability & Deflection Criteria*** *Vibration Comfort Limits • Lateral Sway & Drift Limits • Resonance Avoidance • Dynamic Stiffness Requirements*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

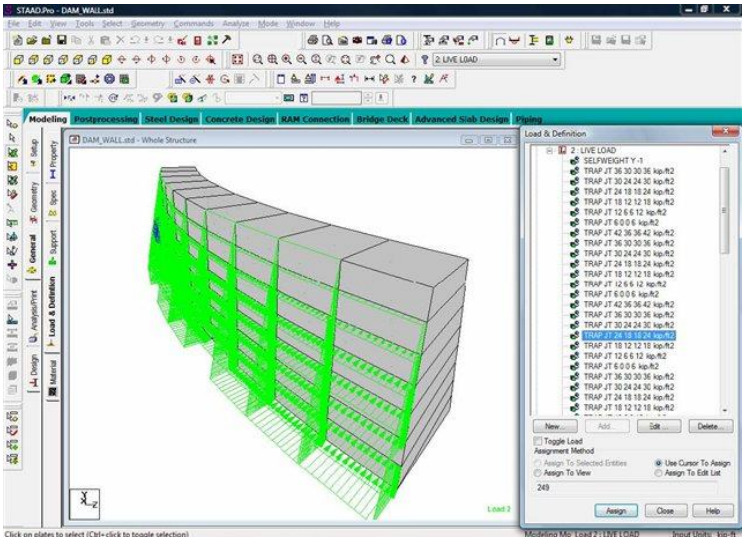
Day 4: ***Thursday, 23rd of October 2025***

0730 – 0830	***Dynamic Response Control Systems*** *Passive Systems (TMD, Base Isolators) • Active Control Systems • Semi-Active Control Devices • Smart Materials & Adaptive Systems*
0830 – 0930	***Reliability in Dynamic Design*** *Probabilistic Design Methods • Reliability Index & Safety Factors • Failure Probability Estimation • Case Studies of Failures*
0930 – 0945	*Break*
0945 – 1100	***Risk Assessment & Safety Evaluation*** *Hazard Identification for Dynamic Loads • Risk Matrix & Evaluation • Mitigation Strategies • Emergency Preparedness*
1100 – 1230	***Inspection & Monitoring of Elevated Structures*** *Non-Destructive Testing (NDT) Methods • Structural Health Monitoring (SHM) • Sensor Systems for Vibration Analysis • Maintenance Planning*
1230 – 1245	*Break*
1245 – 1330	***Failure Case Studies*** *Tacoma Narrows Bridge Collapse • Offshore Platform Failures • Seismic Failures of Elevated Tanks • Lessons Learned & Design Improvements*
1330 – 1420	***Sustainability in Dynamic Design*** *Energy-Efficient Design Methods • Material Optimization • Lifecycle Cost Analysis • Sustainable Construction Practices*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5:	***Friday, 24th of October 2025***
0730 – 0830	***Design of Tall Towers*** *Structural Configuration & Slenderness Ratio • Dynamic Stability Under Wind & Seismic • Control Devices for Tall Towers • Case Studies*
0830 – 0930	***Design of Offshore Platforms*** *Jacket versus Floating Structures • Hydrodynamic Load Analysis • Dynamic Bracing Design • Reliability-Based Design*
0930 – 0945	*Break*
0945 – 1100	***Design of Elevated Tanks & Silos*** *Seismic Considerations for Tanks • Dynamic Sloshing Effects • Foundation Flexibility • Detailing Practices*
1100 – 1215	***Design Software Workshop*** *SAP2000 Dynamic Analysis • STAAD.Pro for Elevated Tanks & Towers • ANSYS for Vibration & Fatigue • Hands-on Case Study*
1215 – 1230	*Break*
1230 – 1300	***Integrated Design Project*** *Team-Based Project Simulation • Load Definition & Modeling • Dynamic Analysis & Design Iteration • Presentation of Results*
1300 - 1345	***Wrap-Up & Future Trends*** *Innovations in Materials (UHPC, Composites) • AI & Machine Learning in Structural Dynamics • Digital Twins for Monitoring Elevated Structures • Future of Resilient Elevated Design*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulators (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using one of our state-of-the-art simulator "STAAD-PRO".



"STAAD-PRO"

Course Coordinator

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