COURSE OVERVIEW OE0022

Offshore Pipeline Global Buckling

Course Title
Offshore Pipeline Global Buckling

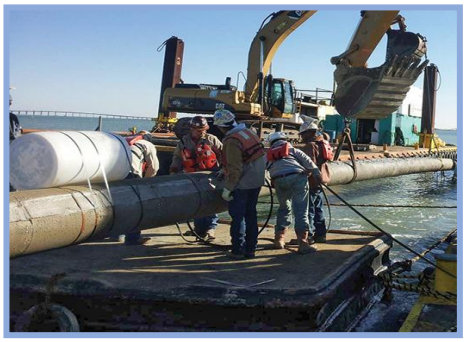
Course Reference
OE0022

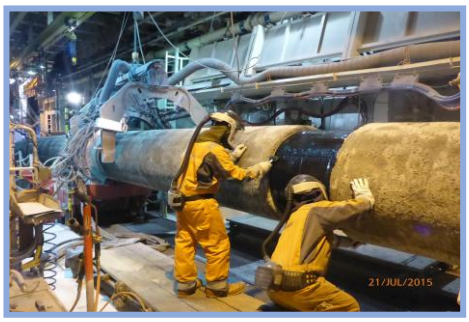
Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	February 08-12, 2026	Meeting Plus 9, City Centre Rotana, Doha, Qatar
2	June 22-26, 2026	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
3	August 02-06, 2026	Crowne Meeting Room, Crowne Plaza Al Khobar, an IHG Hotel, Al Khobar, KSA
4	November 02-06, 2026	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

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.

Global buckling of a pipeline implies buckling of the pipe as a bar in compression. The global buckling may appear either downwards (in a free span), horizontally (lateral buckling on the seabed) or vertically (as upheaval buckling of buried pipelines or on a crest of exposed pipelines normally followed by a lateral turn-down). Local buckling on the other hand is a gross deformation of the pipe cross section.

Global buckling is a response to compressive effective axial force and global buckling reduces the axial carrying capacity. Pipelines exposed to potential global buckling are then either those with high effective axial compressive forces, or pipelines with low buckling capacity, typically light pipelines with low lateral pipe-soil resistance.

This course provides a comprehensive overview of the global buckling of offshore pipelines. It covers the local buckling for stress/strain based design, lateral buckling of straight line and flat seabed, upheaval buckling, global buckling design, buckling during pipeline installation and the reliability based upheaval buckling design.

The course discusses in details the various international codes and standards including the API and the DNV rules. Finally, the course provides an up-to-date methods and procedure for buckled pipeline inspection and repair.

Course Objectives

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

- Apply and gain an in-depth knowledge on offshore pipeline global buckling
- Identify the components of subsea field covering subsea structures and pipelines, rigid risers and pipeline systems
- Discuss the design codes for subsea pipeline design including API 1111, DNV-OS-F101, PD 8010-2 and DNV-OS-F109
- Employ pipeline installation methods covering J-lay, S-lay, reeling and floating sections as well as illustrate thermal expansions and local buckling for stress and strain based design
- Determine on-bottom stability concept and lateral buckling of straight line on flat sea bed
- Recognize upheaval buckling, buckling analysis and global buckling design
- Perform buckling during pipeline installation as well as asses acceptance criteria, reliability based upheaval buckling design and pipeline free spans
- Inspect and repair subsea pipelines in a professional manner

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 offshore pipeline global buckling. Pipeline engineers, subsea engineers and project engineers will definitely benefit from the practical aspects of this course. Project managers from pipeline discipline who wish to get involved in offshore and subsea industry will gain an excellent knowledge from the operational aspects of this course.

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 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. Luis Manuel is a **Senior Offshore Engineer** with over **30 years** of extensive and practical experience within the **Oil**, **Gas**, **Petrochemical** and **Petroleum** industries. His expertise includes **Pipelines** & **Piping** Design, Inspection & Maintenance (**ASME B31**, **API 579** & **API 580**), **Offshore Structure** Engineering, Risk-Based Inspection (**RBI**), Integrity Assessment, Forensic Analysis, Structural Analysis, Design & Engineering, Naval Architecture, Regulatory Compliance Inspections, **Stress & Fatigue Analysis** using **SACS**, **StruCad**, **Caesar II** and **Finite Element Analysis** simulators. He was the **Technical Advisor** and **Engineering Manager** of a leading international engineering firm where he led all Inspections, Structural Engineering and Pipeline Projects for **Total-ELF**, **Shell** and **Mobil**.

During his career life, Mr. Manuel has gained his thorough practical experience in **multiple engineering disciplines** that includes pipeline/piping inspection and engineering, naval engineering, container cargo lashing, aerospace engineering and offshore structural engineering (oil and gas exploration platforms) through several challenging positions such as the **Senior Pipelines Engineer**, **Senior Piping Engineer**, **Senior & Lead Structural Engineer**, **Staff Engineer**, **Naval Architect** and **Applications Engineer** for various international companies including **Chevron**, **ExxonMobil**, **Addax Petroleum**, **ZAGOC**, **NASSCO**, DWC, Point Engineering, **US ARMY**, W.S. & Atkins, Atlas Engineering, **Heerema Offshore**, Casbarian Engineering Associates (CEA), Textron Marine, Ingalls Shipbuilding and Peck & Hale. Further, he has been heavily involved in the development of fabrication and erection drawings for offshore structures including installation and rigging as well as in the instruction materials as authorized by EDI (**Engineering Dynamic Incorporated**) for the training of engineers on the Structural Analysis Computer System (**SACS**) software.

Mr. Manuel has a **Bachelor** degree in **Mechanical Engineering** from the **State University of New York**. Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management** (**ILM**), a **Certified Instructor/Trainer** and the **author** of the book "**Offshore Platforms Design**" and the "**SACS Software Training Module**".

Accommodation

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

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.
Doha	**US$ 6,000** per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Al Khobar	**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.
Abu Dhabi	**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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Subsea Field Components*** *Subsea Structures ● Subsea Pipelines ● Rigid Risers ● Pipeline Systems*
0930 – 0945	*Break*
0945 – 1100	***Overview of Design Codes for Subsea Pipeline Design*** *API 1111 ● DNV-OS-F101 ● PD 8010-2 ● DNV-OS-F109*
1100 – 1230	***Pipeline Installation Methods*** *J-Lay ● S-Lay ● Reeling ● Floating Sections*
1230 – 1245	*Break*
1245 – 1400	***Thermal Expansion*** *Strain of Pipe Under Thermal Load ● Stress in Pipe Under Thermal Load ● Pipeline Displacements & Forces ● Expansion Movement ● Anchor Forces ● Flange Loads & Spool Design*
1400 – 1420	***Video Presentation*** *"Murray & Roberts Marine Subsea Pipeline Installation" ● "Offshore Pipeline Construction"*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Local Buckling for Stress/Strain Based Design*** *Local buckling Checks – Load-Controlled Criteria (DNV-OS-F101) ● Local Buckling Checks –Displacement-Controlled Criteria (DNV-OS-F101) ● Axial Strain Check (DNV-OS-F101)*
0930 – 0945	*Break*
0945 – 1100	***Local Buckling for Stress/Strain Based Design (cont'd)*** *Strain Limits & ECA Requirements ● Hydrogen-Induced Stress Cracking (DNV-RP-F112)*

1100 – 1230	***On-Bottom Stability*** *On-bottom Stability Concept ● Hydrodynamics of Current & Wave*
1230 – 1245	*Break*
1245 – 1400	***On-Bottom Stability (cont'd)*** *Stability Assessment Approaches (DNV-OS-F109)*
1400 – 1420	***Practical Session #1*** *Upheaval Buckling Calculation Example*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0930	***Lateral Buckling of Straight Line on Flat Seabed*** *Soil-Pipe Interaction ● Geotechnical Data of the Seabed ● Soil Lateral Friction Coefficient ● Equations for Lateral Buckling ● Values for Buckling Constants ● Total Expansion into the Buckle*
0930 – 0945	*Break*
0945 – 1100	***Upheaval Buckling*** *Difference Between Lateral Buckling & Upheaval Buckling ● Analysis of Up-Lifts ● Maximum Required Download ● Interaction Between Lateral & Upheaval Buckling*
1100 – 1215	***Buckling Analysis*** *Using Software to Perform Buckling Analysis ● Using Soil Friction & Shear Strength Data to Generate Springs to Support Pipeline Model*
1215 – 1230	*Break*
1230 – 1315	***Hands-on Exercise*** *Building a Subsea Pipeline Model using Ple4Win Design Software*
1315 – 1420	***Class Forum*** *Review of Presented Material*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Global Buckling Design*** *Pipeline on Flat Seabed (Strength & Fatigue Check, Pre-Snaking; Buckle Trigger) ● Pipeline on Uneven Seabed (Strength & Fatigue Check, Pre-Snaking; Buckle Trigger)*
0930 – 0945	*Break*
0945 – 1100	***Global Buckling Design (cont'd)*** *Buried Pipeline & Upheaval Buckling Prevention ● Dynamic Buckling Analysis*
1100 – 1215	***Buckling During Pipeline Installation*** *Stress in Pipeline while Suspended from the Lay Ship/Barge & Partially Supported by the Seabed ● Stress Limits on Overbend & Sagbend (DNV-OS-F101)*
1215 – 1230	*Break*
1230 – 1330	***Acceptance Criteria*** *Local Buckling Tests ● API 1111 & DNV-OS-F101*
1330 – 1420	***Practical Session #2*** *Chose a Submarine Pipeline Route Based on Seabed Topography Exercise*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Reliability Based Upheaval Buckling Design*** *Required Burial Depth to Prevent Upheaval Buckling for the Buried Pipe ● Limit State Function ● Reliability-Based Design of Burial Depth*
0930 – 0945	*Break*
0945 – 1100	***Pipeline Free Spans*** *Freespan Concept ● Freespan Response Parameters ● Static Response ● In-Line & Cross-Flow VIV*
1100 – 1200	***Subsea Pipelines Inspection & Repairs*** *Reasons for Underwater Inspections ● Reliability of Inspection Data ● Methods for Repairing Pipeline Buckled Sections*
1200 – 1215	*Break*
1215 – 1345	***Video Presentation*** *"BISEP™ - Subsea Pipe Buckle Line Replacement" ● GASPROM Pipeline Installation"*
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

Jaryl Castillo, Tel: +974 6652 9196, Email: jaryl@haward.org