COURSE OVERVIEW OE0080-4D
Subsea Pipeline Engineering

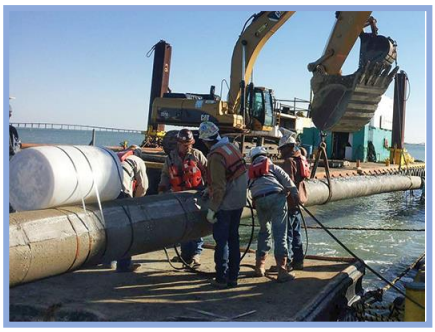
Course Title
Subsea Pipeline Engineering

Course Date/Venue
Session 1: October 14-17, 2024/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: December 16-19, 2024/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
OE0080-4D

Course Duration/Credits
Four days/2.4 CEUs/24 PDHs

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.

This course covers the whole subject of subsea pipeline engineering, from system design and route selection through detailed engineering to construction, inspection, maintenance and decommissioning. It includes a large number of actual case studies and examples, some from the Gulf and others from the North Sea, North America and Africa.

The course does not require previous experience of marine pipelines, but it is not a superficial overview, and it goes into detail about current thinking and recent developments. It includes a design exercise carried out by the delegates, working in small groups and under the guidance of the lecturer.

Further, this course will also discuss the marine pipeline construction, route selection, hydraulics and flow assurance; the pipeline configuration, diameter and route selection; the design for strength as well as insulation and temperature control; and the marine environment, carbon steel line pipe, material of service and increasing corrosion resistance.

During this interactive course, participants will learn the internal corrosion, external corrosion and coatings as well as the significance of cathodic protection; the correct process of lateral and upheaval buckling including pipelaying, codes, microbiological corrosion and spans; the proper method of shore approaches and the design for stability; the welding and decommissioning including pipeline construction; the mishap, risk and repair including trenching and burial; and the future development, inspection and monitoring for subsea pipeline.

Course Objectives

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

- Apply and gain an in-depth knowledge on subsea pipeline engineering
- Discuss marine pipeline construction, route selection, hydraulics and flow assurance
- Demonstrate the design exercise including pipeline configuration, diameter and route selection
- Explain the design for strength as well as insulation and temperature control
- Recognize the marine environment and discuss the carbon steel line pipe, material of service and increasing corrosion resistance
- Differentiate the internal corrosion, external corrosion and coatings as well as the significance of cathodic protection
- Implement the correct process of lateral and upheaval buckling including pipelaying, codes, microbiological corrosion and spans
- Employ the proper method of shore approaches and describe the design for stability
- Evaluate the design exercise and conclusion and discuss welding and decommissioning including pipeline construction
- Explain mishap, risk and repair including trenching and burial
- Classify the future development, inspection and monitoring for subsea pipeline

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 subsea pipeline engineering for engineers from oil and gas companies, construction companies, pipe and service suppliers and regulatory authorities, who are newly qualified, have recently moved into pipeline engineering or hold broad responsibilities that include pipelines.

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.

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

Course Fee
US$ 6,750 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), 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. 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**".

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	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	**PRE-TEST**
0830 – 0900	**Design Overview & Introduction to Marine Pipeline Construction** Introduction to Design Sequence & its Interaction with the Different Topics Covered in the Course • Film on Construction & Connection of an Offshore Pipeline
0900 – 0930	**Route Selection** Principles of Route Selection • Constraints Imposed by Oceanographic, Geotechnical, Environmental, Safety & Political Factors • Case Studies From Canada, Spain & Tanzania
0930 – 0945	Break
0945 – 1030	**Hydraulics & Flow Assurance** Single-Phase Flow, Oil & Gas; Calculation of Pressure Drop & Effect on Optimal Line Size; Influence of Compressibility, Temperature Change & Profile, Two Phase Flow; Flow Regimes, Correlations, Profile Effects, Terrain-Induced Slugging, Slugging in Risers • Hydrates & Wax
1030 – 1100	**Introduction to Design Exercise** The Design Exercise is a Pipeline System off the Coast of the USA • It Presents several Route Selection, Design & Construction Problem • Participants will work in small groups & select the System Design & Route • Carryout Preliminary Design & Assessment of Construction Methods
1100 – 1130	**Design Exercise Phase 1** Pipeline Configuration, Diameter & Route Selection
1130 – 1215	**Presentation of Conclusions of Phase 1 of Design Exercise** Participants Present their Choices of Route
1215 – 1230	Break
1230 – 1330	**Design for Strength** Internal Pressure, code Requirements • External Pressure; Bending; Bending Buckling; Collapse & Buckle Propagation; Denting & Gouging; Allowable Strain Design; Impact Damage
1330 – 1420	**Insulation & Temperature Control**
1420 – 1430	**Recap**
1430	Lunch & End of Day One

Day 2

0730 – 0830	**Marine Environment** Waves • Currents: Tide, Storm Surge, Loop Currents; Seabed Geotechnics; Biology
0830 – 0930	**Carbon Steel Line Pipe** Fabrication of API Pipe • Increasing The Strength of Pipeline Steel • Balancing Strength, Toughness & Weld Ability
0930 – 0945	Break
0945 – 1030	**Materials For Sour Service** Pipeline Steels for Sour Service: Sulfide Stress Cracking & HIC • Appropriate Specification of Pipe Material

1030 – 1100	***Increasing Corrosion Resistance*** *Increasing the Corrosion Resistance of Carbon Steels ● Limitations of Use of Solid Corrosion Resistant Alloys ● Internally Clad Pipe ● Flexible Pipe*
1100 – 1130	***Internal Corrosion*** *Sweet Corrosion Mechanisms; Pitting & Mesa Attack ● Evaluating a Suitable Corrosion Allowance ● Effects of Flow on Corrosion ● Corrosion Inhibition*
1130 – 1215	***External Corrosion & Coatings*** *Coating for Submarine Pipelines: Enamels, FBE, Triple Coats, Extruded Coatings & Elastomers ● Inspection of Coating Integrity ● Field Joints*
1215 – 1230	*Break*
1230 – 1330	***Cathodic Protection*** *Conjoint Protection by Coating & Cathodic Protection ● Mechanism of CP ● Design of Sacrificial Anode CP Systems ● Thermal Effects on CP Performance ● Interactions between CP Systems*
1330 – 1420	***Lateral & Upheaval Buckling*** *Upheaval Buckling Onshore ● Driving Force ● Analysis ● Alternative Approaches to Control of Upheaval ● Case Study of Lateral Buckling ● Ongoing Studies*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Pipelaying*** *Alternative Construction Techniques ● Laybarge S-lay & J-lay ● Reeling ● Surface, Mid-Depth & Bottom Tow ● Videos Illustrating Alternatives*
0830 – 0930	***Codes*** *Historical Background ● Use & Misuse of Codes ● Alternative Approaches to Codes ● Limit States ● Code Calibration ● Recent Developments: DNV OS F101 2007 & ISO*
0930 – 0945	*Break*
0945 – 1030	***Microbiological Corrosion*** *Sulphate-Reducing Bacteria ● Microbiological Corrosion Mechanisms ● Evaluation of the Severity of the Problem ● Housekeeping & Treatment*
1030 – 1100	***Spans*** *Description of Span Occurrence ● Need not to Exaggerate Problem ● Analysis: Vortex-induced Vibration, Overstress, Hooking ● Case Study ● Span Monitoring & Correction*
1100 – 1130	***Shore Approaches*** *Coastal Environment & Shallow-Water Processes. ● Difficulties of Construction Close to Shore ● Alternative Construction Methods ● Case Studies*
1130 – 1215	***Design for Stability*** *Hydrodynamic Forces in Steady & Unsteady Flow ● Lateral Resistance ● RP E305 & RP F109 ● Software ● Case Studies ● Interaction with Seabed Instability ● Current Research*
1215 – 1230	*Break*
1230 – 1330	***Design Exercise Phase 2*** *Continuing the Exercise begun on day 1, participants work in teams to decide of the Pipeline Diameters, Materials, Wall Thicknesses, Coating, Cathodic Protection, Construction Method, Shore Crossing Design, & Recommendations for the next Stage of the Project*

1330 – 1420	***Conclusions of Design Exercise*** *Participants Present their Designs ● The Lecturers Critique the Participants' Designs & Support the Discussion with Additional Calculations*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0830	***Welding*** *Welding of Carbon Manganese Pipeline Steels ● Welding of Duplex & Clad Pipe ● Inspection of Welds*
0830 – 0930	***Decommissioning*** *Legal, Environmental & Financial Background ● Legislation ● Decay Mechanisms ● Alternative Strategies: Stabilisation, Recovery, Re-use*
0930 – 0945	*Break*
0945 – 1030	***Pipeline Construction Videos: Ormen Lange Pipeline, Landfall***
1030 – 1100	***Case Studies: Gulf of Mexico & Tanzania*** *The King Project engaged with a number of issues covered in earlier lectures, among them Hydrate Control, Upheaval Buckling & Deep-Water Pipelaying ● The Mnazi Bay Project involved issues of choice of Route, Remote Location, Stability, Dredging & Construction*
1100 – 1130	***Mishaps, Risk & Repair*** *Safety of Marine Pipeline Systems ● Reliability Analysis ● Case Studies of Failures & Subsequent Repairs ● Integrity Management*
1130 – 1215	***Trenching & Burial*** *Reasons for Trenching & Burial ● Alternatives: Jetting, Cutting, & Ploughing*
1215 – 1230	*Break*
1230 – 1300	***Current & Future Developments*** *Progress in Marine Pipelines: New Concepts, Materials, Construction Techniques, Welding Methods*
1300 – 1345	***Inspection & Monitoring*** *Inspection before & during Installation & Commissioning ● Inspection in Service ● Intelligent Pigging ● Corrosion Monitoring ● Analysis of Corrosion Monitoring Data*
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

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