

COURSE OVERVIEW FE0080-4D

Piping Vibration Analysis & Practical Engineering Solutions

Course Title

Piping Vibration Analysis & Practical Engineering Solutions

Course Date/Venue

December 16-19, 2024/Al Aziziya Hall, The Proud Hotel Al Khobar, Al Khobar, KSA

Course Reference

FE0080-4D

Course Duration/Credits

Four days/2.4 CEUs/24 PDHs



Course Description



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

This course provides a thorough review of a wide variety of causes of piping vibration from the point of view of an engineer that must identify the cause of vibration, determine if vibration is excessive, and correct the problem if it is. It provides a background on fundamental causes of piping vibration and how to identify source of vibration, rules of thumb and simplified methods for evaluating vibration severity, and methods of treatment.



A wide variety of causes of vibration are covered in order to enable the course participant to properly evaluate the variety of piping vibration problems that can occur in piping systems. The causes of vibration, where possible, are discussed with respect to very basic energy and momentum principles that enable the participant to understand what is happening within and to the piping system. Screening and simple vibration limits are provided.



Many actual examples of typical plant piping vibration problems that the course instructor has solved are reviewed to illustrate the concepts covered. In addition, participants are encouraged to bring examples of troublesome vibration problems they have experienced or are experiencing in their plants for class discussion.

Course Objectives

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

- Analyze the vibration of piping system and implement the correct predictive maintenance method
- Discuss the concepts of mechanical vibration including high frequency vibration and learn what acoustic resonance is as well as its application on piping vibration analysis
- Identify the parts of the reciprocating compressor systems and be able to review its features and functions
- Describe what an acoustic fatigue is and become familiar with the concept of slug flow and surge including their features
- Distinguish piping systems with reciprocating pumps and recognize their role on vibration analysis
- Determine the other sources of vibration and be able to learn their features and application
- Improve the practical methods for evaluating piping vibration using simple rules and recognize their importance in piping vibration analysis and practical engineering solutions
- List down the various piping restraints and have a good overview of the different solutions to vibration problems
- Demonstrate sample piping vibration problems to become more acquainted on the techniques of piping vibration analysis and its engineering solutions
- Present case studies and practical sample scenarios to further understand the concepts of vibration analysis in piping.

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 a wide understanding and deeper appreciation of piping vibration analysis and practical engineering solutions for engineers who are responsible for operating existing piping systems. However, designers of new piping systems will also find the broad coverage of potential vibration problems a time saving briefing on the variety of vibration problems that can occur in piping systems.

Course Fee


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.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course.

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 **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.

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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.

Accommodation

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

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. Reda Hassan is a **Senior Inspection Engineer** with over **20 years** of extensive experience within the **Oil, Gas, Refinery** and **Petrochemical** industries. His expertise widely evolves in **Vibration System & System One/Bentley Nevada**, Risk Based Inspection (RBI) **API 580/581**, Fitness For Service (**F.F.S**), **Life Extension Analysis**, Risk-Based Inspection (RBI); **Tank Inspection**; **Pressure Vessel Inspection**; **Piping Inspection**; **Construction, Installation Fabrication, Erection, Inspection, Maintenance, Operation, Rating, Repair, Alteration, Reconstruction, Pigging, Integrity Assessment, Flaw Evaluation, fitness-for-service (FFS) of Piping, Piping Inspection, Pipelines, Tanks, Fuel Storage Tanks, Boiler, Pressure Vessel, Pigging, Pump & Valve Technology, Centrifugal Pump, Machinery Bearings & Lubrication, Hydraulics, Welding Technology, Non-Destructive Testing (NDT), Cathodic Protection of Pipelines, Maintenance of Rotating Machinery and Maintenance Management & Planning.** Further, he is also well-versed in various **international codes and standards** such as **API 570, API 620, API 650, API 653, API 510, API 580, API 598, API 1104, ASME B31, ASME B31.3 and ASME B31.8.** Currently, he is the **Engineering Head of GUPCO BP (British Petroleum).**

During his career life, Mr. Reda has worked with numerous multi-national companies such as **GUPCO BP, Saipaim Engineering, Tractebel Engineering Suez, Story TransGas (STG)** and **SGC** for international clients as the **Technical Consultant & Trainer, Section Head Projects Engineer, Maintenance & QC Engineer, Mechanical Supervisor** and **NDT Supervisor.**

Mr. Reda has a **Bachelor** degree in **Mechanical Engineering.** He is a **Certified Tank Inspector (API-653)**, a **Certified Pressure Vessel Inspector (API-510)**, **Certified Piping Inspector (API-570)**, a **Certified Risk Based Inspector (API-580)** as well as a **Certified ASNT Level II** in Radiographic Testing (RT), Ultrasonic Testing (UT), Magnetic Particle Testing (MT) and Liquid Penetrate Testing (PT). Further, he is on the process of completing the **PMP-PMI certification** and he has delivered numerous technical courses, trainings and workshops worldwide.

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: Monday, 16th December 2024

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Introduction
0930 – 0945	Break
0945 – 1100	Vibration Fundamentals & Definition
1100 – 1215	Mechanical Vibration Concepts
1215 – 1230	Break
1230 – 1420	Mechanical Vibration Concepts (cont'd)
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2: Tuesday, 17th December 2024

0730 – 0930	Source of Piping Vibration
0930 – 0945	Break
0945 – 1100	Flow Induced Vibration
1100 – 1215	Slug Flow (Water Hammer)
1215 – 1230	Break
1230 – 1420	Surge (Pressure Wave Water Hammer)
1420 – 1430	Recap
1430	Lunch & End of Day Two

Day 3: Wednesday, 18th December 2024

0730 – 0930	Piping Vibration Involving Control Valves
0930 – 0945	Break
0945 – 1100	Other Sources of Vibration
1100 – 1215	Practical Methods for Evaluating Piping Vibration
1215 – 1230	Break
1230 – 1420	Acceptance Criteria (ASME B31 Series)
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4: Thursday, 19th December 2024

0730 – 0930	Methods of Piping Vibration Damping
0930 – 0945	Break
0945 – 1100	Sample Piping Vibration Problems
1100 – 1215	Case Studies
1215 – 1230	Break
1230 – 1345	Open Session with Student Vibration Problems
1345 – 1400	Course Conclusion
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Simulator (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 the state-of-the-art simulator “iLearnVibration”.



Course Coordinator

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