COURSE OVERVIEW ME0905
CAESAR-II: Piping Modelling and Stress Analysis

Course Title
CAESAR-II: Piping Modelling and Stress Analysis

Course Date/Venue
October 19-23, 2025/Boardroom 2, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
ME0905

Course Duration
Five days/3.0 CEUs/30 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.

Ensuring your plant's piping systems adhere to international codes and standards plays an integral role in keeping your plant operational. CAESAR II software makes it easy to input and display all the data needed to accurately define a piping system analysis model. It evaluates the structural responses and stresses of your piping systems to international codes and standards and enables you to access and modify, if necessary, input element by element or globally.

The course is designed to provide delegates with a good working knowledge on pipe modelling and stress analysis using CAESAR II software. It covers the stress analysis; piping code history with the aspects of stress theory; the functions and usage of CAESAR-II and the mathematics behind it; the various load types and different failure criteria; the importance of pipe stress analysis; modeling issues; and the various theory of designing for expansion loads and flexibility.

At the completion of the course, participants will be able to carryout different detailed problem solving of a complex model; acquire insights on the components of buried pipe modeling; identify the elements of modes and model shapes; determine the aspects of spectral, impact and earthquake analysis, components of time history analysis, steam hammer, slug flow and relief valve firing; apply harmonic loads and harmonic analysis in piping stress; evaluate the significance of flow induced and mechanical vibrations in stress analysis; practice problem solving workshops independently; and solve a variety of stresses and equipment load problems.

Course Objectives

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

- Perform pipe modelling and stress analysis using Caesar-II software
- Review the roles of a stress analyst, perform stress analysis and evaluate the piping code history with the aspects of stress theory
- Discuss the functions and usage of CAESAR-II and the mathematics behind it and perform practical examples in line with input, analysis and redesign
- Enumerate the various load types and different failure criteria such as primary and fatigue failures and recognize the importance of pipe stress analysis
- Demonstrate modeling issues relative to bends, reducers, valves, rigid elements, control parameters, non-linearity of restraints, connecting nodes, built in databases and other modeling issues
- Recognize the various theory of designing for expansion loads and flexibility as well as sustained loads in relation with support configuration issues, spring hanger design, and optimization of sustained loads and perform various practical exercises
- Carryout different detailed problem solving of a complex model including imposed thermal displacements, verification of API 610 pump loads, local vessel flexibilities using WRC 297 and others
- Acquire insights on the components of buried pipe modeling, the fundamentals of dynamic analysis theory, types of loads and evaluation of system responses
- Identify the elements of modes and model shapes, general principles of modal analysis, load types and analysis in CAESAR-II
- Determine the aspects of spectral, impact and earthquake analysis, components of time history analysis, steam hammer, slug flow and relief valve firing
- Apply harmonic loads and harmonic analysis in piping stress and evaluate the significance of flow induced and mechanical vibrations in stress analysis
- Practice problem solving workshops independently and solve a variety of stresses and equipment load problems

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 pipe modelling and stress analysis using CAESAR II software for those who are involved with piping in the petroleum, chemical, power, gas transmission and related industries. Further, mechanical/design engineers, piping vessel maintenance engineers, engineering managers, piping designers, plant managers, draftsmen, new and experienced CAESAR-II users can benefit from this up-to-date, information-packed short course, whether they use other pipe stress programs – or don't use any.

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**. 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. Moayyad Sanori is a **Senior Mechanical & Maintenance Engineer** with almost **30 years** of extensive experience within the **Oil & Gas, Petroleum** and **Utility** industries. His expertise widely covers in the areas of **CAESAR Pipe Stress Analysis**, **CAESAR-II** Input, Analysis & Redesign, **Pipeline** System Design, Construction, Maintenance and Repair, Facilities & **Pipeline** Integrity Assessment, **Pipeline** Welding Practices, **Fire Protection & Life Safety** System Testing, **Sprinkler System** Inspection & Maintenance, **Standpipe & Hose** Systems, **Fire Pump** Maintenance, **Water Storage Tank** Inspection, **Valve** Inspection & Testing, **Safety Relief Valves**, **Air Compressor & Nitrogen Generators**, **Piping** Assessment, **Mechanical Pipe Fitting**, **Fire Pump** Inspection & Testing, **Fire Suppression** Design, **Fired Heaters & Exchangers**, **Process Plant** Operation, **Hydrocarbon Production** Operation, Monitoring & Maintaining **HSE Systems**, Emergency & Critical Situations Control, Integrated Process Systems Start-up, Shutdown, Monitoring & Control, **Process Plant** Equipment Isolation, **Maintenance & Reliability** Management, **Site Reliability Optimization Plan**, **Root Cause Analysis** Techniques, **Rotating Equipment**, **Preventive & Predictive** Maintenance, **Condition Monitoring**, **Work** Planning & Scheduling, **Reliability**, **Assessment**, **Mechanical Maintenance**, **Preventive & Predictive** Maintenance, Machinery Failure Analysis (**RCFA**), **Condition Based Monitoring**, **Centrifugal Pumps & Compressors** Overhauling, **Positive Displacement Pump**, **Heat Exchangers**, **Steam & Gas Turbine**, **Heat Recovery Steam Generator**, **Combined Cycle**, **Pipe Erection** Installation, **Welding** Operations, **Tank Pressure LPG**, **CNC Fabrication**, **Safety Valves**, **Distillation Columns**, **Gearbox**, **Pipe Fitting**, **Lathes**, **Milling**, **Diesel Engines**, **Boiler & Burners**, **Turbines & Motors**, **Power Piping**, and **ASNT-NDT Inspection** Methods. He is currently the **General Maintenance Supervisor** of **Jable Oil Services** with collaboration of **Waha Oil Company** wherein he is responsible in supervising the maintenance and operation of pumps, compressors, gas turbines, steam turbines, pipe testing and training of new employees.

During Mr. Moayyad's career he has handled key positions as such **Mechanical Maintenance Manager**, **Mechanical Maintenance Supervisor**, **Pipe Testing Supervisor**, **Radiation Supervisor**, **NDT Supervisor**, **General Maintenance Supervisor**, **Piping Testing Engineer**, **NDT Technician**, **Mechanical & Pipe Fitting Instructor** and **Pump Maintenance Technician** of various international companies including **Jordan Petroleum Refinery Company**, **Saudi Aramco**, Rawabi Industrial Support Services, Experts Industrial Testing Company, Petra for Mechanical Testing Company and Al-Waei Metal Forming Establishment.

Mr. Moayyad has an **Associate Diploma** in **Mechanical Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified ASNT-NDT Level II** in Radiography (**RT**), Magnetic Particle Testing (**MT**), **Liquid Penetrant Testing** (**PT**) and **Ultrasonic Thickness Testing** (**UTT**) and a **Certified Assessor** by **City & Guilds Level 3 Certificate in Assessing Vocational Achievement** under the **TAQA Qualification** (**Training**, **Assessment & Quality Assurance**). He has further delivered numerous trainings, courses, seminars, workshops 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:-

100% Hands-on Practical Exercises, Case Studies and Simulation

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.

Accommodation

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

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: ***Sunday, 19th of October 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Role of the Stress Analyst***
0900 – 0900	***When to Perform Stress Analysis***
0930 – 0945	*Break*
0945 – 1015	***Piping Code History***
1015 – 1045	***Stress Theory, Evaluating Stresses on Piping & Knowing which Ones Matter***
1045 – 1115	***Load Types, Failure Criteria, Primary & Fatigue Failures***
1115 – 1200	***Code Equations & Stress Intensification (SIFs)***
1200 – 1215	*Break*
1215 – 1420	***Overview of CAESAR-II Functions & How to Use the Program***
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: ***Monday, 20th of October 2025***

0730 – 0830	***Detailed, Important Modeling Issues-Bends, Reducers, Valves, Rigid Elements, Control Parameters, Non-linearity of Restraints, Connecting Nodes, Built-in Databases & Assorted Modeling Issues***
0830 – 0930	***The Mathematics Behind CAESAR-II-Stiffness Matricies & Related Issues***
0930 – 0945	*Break*

0945 – 1030	***Practical Examples Using CAESAR-II; Input, Analysis & Redesign***
1030 – 1100	***Theory–Designing for Sustained Loads & Support Configuration Issues, Spring Hanger Design & Optimization of Sustained Loads***
1100 – 1200	***Practical Examples***
1200 – 1215	*Break*
1215 – 1420	***Theory–Designing for Expansion Loads & Flexibility***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3: ***Tuesday, 21st of October 2025***

0730 – 0830	***Practical Examples***
0830 – 0930	***Detailed Problem Solving of a Complex Model*** *Imposed Thermal Displacements ● Expansion Joint Modeling and Evaluation ● Structural Steel Modeling ● Spring Hanger Design ● Combining Steel with Piping*
0930 – 0945	*Break*
0945 – 1030	***Detailed Problem Solving of a Complex Model (cont'd)*** *Verification of API 610 Pump Loads ● Local Vessel Flexibilities Using WRC 297 ● Including Vessel Modeling ● Evaluation of Local Vessel Stresses According to WRC 107*
1030 – 1100	***Problem Solving Workshop-Detailed Example where Each Student Works Independently & Applying What is Learned to Solve a Variety of Stresses & Equipment Load Problems***
1100 – 1200	***Buried Pipe Modeling***
1200 – 1215	*Break*
1215 – 1420	***Dynamic Analysis Theory, Types of Loads & Evaluation of System Responses***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4: ***Wednesday, 22nd of October 2025***

0730 – 0830	***Modes & Mode Shapes***
0830 – 0930	***Modal Analysis***
0930 – 0945	*Break*
0945 – 1030	***Spectral Analysis, Impact & Earthquake Analysis***
1030 – 1100	***Time History Analysis***
1100 – 1200	***Harmonic Loads & Harmonic Analysis***
1200 – 1215	*Break*
1215 – 1420	***Flow Induced Vibration***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

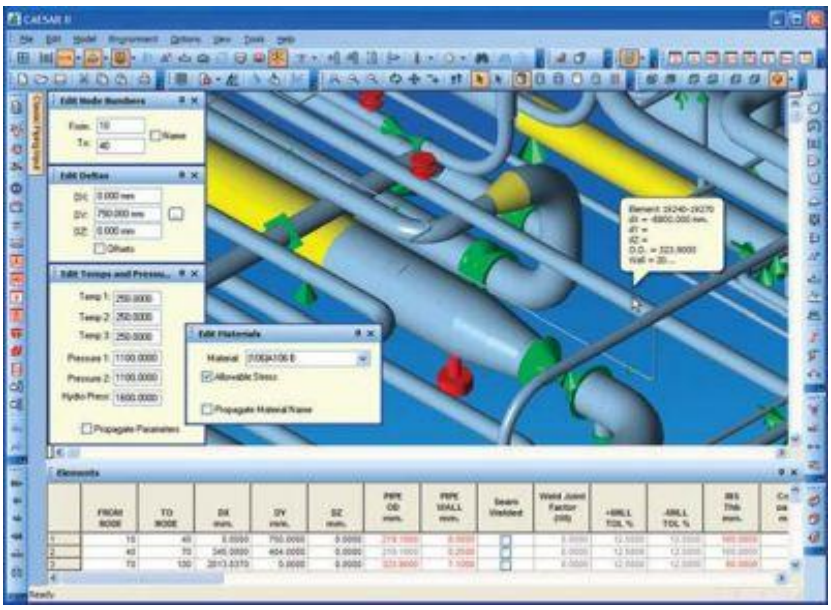
Day 5: ***Thursday, 23rd of October 2025***

0730 – 0830	***Mechanical Vibration***
0830 – 0930	***Impact Load Types & Analysis***
0930 – 0945	*Break*
0945 – 1030	***Steam Hammer***
1030 – 1100	***Slug Flow***
1100 – 1200	***Relief Valve Firing***

1200 – 1215	*Break*
1215 – 1345	***Example Problems*** *Mechanical Induced Vibration Problems and Solutions ● Flow Induced Vibration Problem Solution ● Time History Analysis and Evaluation of Impact Load (Steam Hammer) with Dynamic Restraint (Snubber) ● Spectral Analysis of Impact Load (Relief Valve Firing) ● Earthquake Analysis*
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 "CAESAR II Software".



CAESAR II

Course Coordinator

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