

COURSE OVERVIEW ME1108 Bolt Torquing & Tensioning

<u>Course Title</u> Bolt Torquing & Tensioning

Course Date/Venue

October 19-23, 2025/TBA Meeting Room, The H Dubai Hotel, Sheikh Zayed Rd -Trade Centre, Dubai, UAE

CEUS

Course Reference ME1108

Course Duration/Credits Five days/3.0 CEUs/30 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 is designed to provide participants with a detailed and up-to-date overview of Bolt Torquing & Tensioning. It covers the purpose and function of bolted joints, advantages and limitations, common failure modes and key terminology; the types of fasteners and their applications, joint integrity principles, gasket technology and selection; the torque and load relationship, standards and guidelines, torque tools, and manual torque application; and the hydraulic torque tools, components of hydraulic systems, pump selection and setup, safety during hydraulic torquing and troubleshooting hydraulic issues.

Further, the course will also discuss the torque procedure development, error prevention and troubleshooting, bolt tensioning and hydraulic tensioning systems; the tensioning procedures and planning, advanced tensioning methods, tensioner safety and troubleshooting and controlled bolting assembly procedures; the flange management and joint control, joint integrity testing and maintenance of bolted joints; and the advanced bolting challenges on large diameter bolts, high-temperature joints, cryogenic sealing and subsea bolt tensioning.



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During this interactive course, participants will learn the bolt length and grip considerations, joint stiffness and relaxation, fatigue and vibration impacts and expansion/contraction handling; the load-sensing bolts, digital torque and tension monitors, IoT integration in bolted joints and real-time condition tracking; the industry applications and standards, oil and gas pipelines, pressure vessels and heat exchangers; and the wind turbines and energy sector and offshore platforms.

Course Objectives

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

- Apply and gain an in-depth knowledge on bolt torquing and tensioning
- Discuss the purpose and function of bolted joints, advantages and limitations, common failure modes and key terminology
- Identify the types of fasteners and their applications as well as joint integrity principles, gasket technology and selection
- Explain torque and load relationship, standards and guidelines, torque tools and manual torque application
- Recognize hydraulic torque tools covering components of hydraulic systems, pump selection and setup, safety during hydraulic torquing and troubleshooting hydraulic issues
- Apply torque procedure development, error prevention and troubleshooting as well as recognize bolt tensioning and hydraulic tensioning systems
- Employ tensioning procedures and planning, advanced tensioning methods, tensioner safety and troubleshooting and controlled bolting assembly procedures
- Carryout flange management and joint control, joint integrity testing and maintenance of bolted joints
- Discuss advanced bolting challenges on large diameter bolts, high-temperature joints, cryogenic sealing and subsea bolt tensioning
- Determine bolt length and grip considerations, joint stiffness and relaxation, fatigue and vibration impacts and expansion/contraction handling
- Identify load-sensing bolts, digital torque and tension monitors, IoT integration in bolted joints and real-time condition tracking
- Review industry applications and standards review on oil and gas pipelines, pressure vessels and heat exchangers, wind turbines and energy sector and offshore platforms

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.



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Who Should Attend

This course provides an overview of all significant aspects and considerations of bolt torquing and tensioning for mechanical technicians and fitters, maintenance engineers and supervisors, piping and mechanical inspectors, plant and equipment operators, QA/QC engineers and technicians, construction and commissioning personnel and other technical staff.

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:

• **BAC**

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.



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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. Rod Larmour PEng, MSc, BSc, is a Senior Mechanical Engineer with over 30 years of Onshore & Offshore practical experience within the Power, Petrochemical, Oil & Gas industries. His expertise greatly covers the application of Bolted Flange Design & Stress Analysis, Bolt Torquing & Tensioning, Rotating Machinery, Mechanical Alignment, Stress Analysis, Thermodynamics, Fluid Mechanics, Heat & Mass Transfer

Engineering, Air Conditioning & Refrigeration Technology, Cooling Towers, Gas & Steam Turbines, Centrifugal Compressor & Pumps and the Design, Failure Investigation and Maintenance of Atmospheric Storage Tanks & Tank Farms and Bolted Flanges & Joints.

Currently, Mr. Larmour is working with Transnet overseeing the performance and safety of several **fuel pipelines** including **pumping stations** and **inland tank farms** locally. He also takes lead in the **planning** of detailed design of a **fuel gas supply system** from a site to the **proposed new power station**, the **management** of an **EPC booster gas compressor station** including an **overland piping**, and **spearheads** the **commercial & contractual management** within the **llitha Process Group**.

Throughout Mr. Larmour's lengthy career, he has worked with several international companies like **Mobil**, **Mossgas**, **Stewarts & Lloyds** and **Ilitha** with prime positions such as the **Operations Manager**, **Principal Project Manager**, **Senior Mechanical Engineer**, **Offshore Projects Manager**, **Design Manager**, **Quality Assurance Manager**, **Project Engineer** and **Senior Instructor/Trainer**.

Mr. Larmour's experience was not only confined to the industry alone. He was also able to largely contribute his expertise and impart his knowledge in the academe. He has engaged himself with **researches** and **lectures** in for several international organizations, universities and companies and has held numerous **training courses** on **Thermomechanics & Fluid mechanics**, **Engineering Design**, **Refrigeration & Air Conditioning** and **Heat Transfer**.

Mr. Larmour is **Registered Professional Engineer** and has **Master & Bachelor** degrees in **Mechanical Engineering** and has a **Diploma** in **Nuclear Science**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)** and has delivered various trainings, workshops, seminars, courses and conferences internationally.

Accommodation

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



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Training Methodology

All our Courses are including Hands-on Practical Sessions using equipment, Stateof-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% Lectures20% Practical Workshops & Work Presentations30% Hands-on Practical Exercises & Case Studies20% 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 workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1:	Sunday, 19 th of October 2025
0730 - 0800	Registration & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	PRE-TEST
	Introduction to Bolted Joint Technology
0830 - 0930	Purpose & Function of Bolted Joints • Advantages & Limitations • Common
	Failure Modes • Key Terminology
0930 - 0945	Break
	Types of Fasteners & their Applications
0945 - 1030	Bolt Grades & Classifications • Stud Bolts, Nuts & Washers • Thread Types &
	Pitch • Material Selection Criteria
	Joint Integrity Principles
1030 – 1130	Forces Acting on a Bolted Joint • Preload & Clamp Force Concepts • Torque
	versus Tension Overview • Elastic Interaction
	Gasket Technology & Selection
1130 – 1215	Gasket Types & Materials • Gasket Seating Stresses • Handling & Storage of
	Gaskets • Effects of Temperature & Pressure
1215 - 1230	Break
	Torque & Load Relationship
1230 – 1330	Friction's Role in Torque Application • Torque Scatter & its Impact •
	Lubrication Effects • Calculating Preload
	Standards & Guidelines
1330 - 1420	ASME PCC-1 Overview • API 610 & 682 References • EN & ISO Norms •
	Site Procedures & Compliance
	Recap
1420 - 1430	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
1 / 2 2	Discussed Tomorrow
1430	Lunch & End of Day One



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Day 2:	Monday, 20 ^{err} of October 2025
0730 - 0830	Torque Tools Overview
	Manual Torque Wrenches • Pneumatic Torque Tools • Hydraulic Torque
	Wrenches • Electronic Torque Measurement Tools
0830 - 0930	Manual Torque Application
	<i>Types of Torque Wrenches</i> • <i>Calibration & Care</i> • <i>Correct Usage Techniques</i> •
	Torque Value Verification
0930 - 0945	Break
	Hydraulic Torque Tools
0945 - 1100	<i>Components of Hydraulic Systems</i> • <i>Pump Selection & Setup</i> • <i>Safety During</i>
	Hydraulic Torquing • Troubleshooting Hydraulic Issues
	Torque Procedure Development
1100 - 1215	Bolt Sequence Patterns • Multi-Pass Tightening • Lubrication Protocols •
	Torque Verification Techniques
1215 – 1230	Break
	Error Prevention & Troubleshooting
1230 - 1330	Causes of Under/Over-Torquing • Common Field Issues • Detecting Improper
	Bolting • Prevention Strategies
1330 - 1420	Practical Hands-On Exercises
	Bolt Tightening Using Various Tools Lubrication Application Practice
	Applying Correct Torque Values Team-Based Tightening Drills
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:	Tuesday, 21 st of October 2025
0730 - 0830	Basics of Bolt Tensioning
	Differences from Torquing • When to Use Tensioning • Advantages &
	Limitations • Industry Applications
0830 - 0930	Hydraulic Tensioning Systems
	Tensioner Types & Configurations • Power Packs & Hoses • Setting Up
	Tensioning Tools • Tool Compatibility with Bolt Size
0930 - 0945	Break
	Tensioning Procedures & Planning
0945 – 1100	Load Calculation Methods • Sequence & Load Control • Stretch Measurement
	Multiple Bolt Simultaneous Tensioning
	Advanced Tensioning Methods
1100 – 1215	Elastic Recovery & Nut Rotation • Split Load Tensioning • Bolt Elongation
	Monitoring • Sequential Tensioning Optimization
1215 – 1230	Break
1230 - 1330	Tensioner Safety & Troubleshooting
	Pressure Relief & Bleed-off • Risk Control for Hydraulic Failure • Leak
	Detection • Preventive Maintenance of Tools
1330 - 1420	Practical Exercises in Tensioning
	Equipment Setup • Load Application & Monitoring • Parallel versus
	Sequential Tensioning • Demonstrating Correct Tensioning Sequences
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



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Day 4:	Wednesday, 22 nd of October 2025
0730 - 0830	Controlled Bolting Assembly Procedures
	Flange Alignment & Preparation • Thread Inspection & Cleaning • Gasket
	Centering Techniques • Lubrication Control & Tagging
0830 - 0930	Flange Management & Joint Control
	Flange Condition Assessments • Pre- & Post-Tightening Inspections •
	Recordkeeping for Bolted Joints • Leak Prevention Strategies
0930 - 0945	Break
	Joint Integrity Testing
0945 – 1100	Bolt Load Verification Techniques • Ultrasonic Measurement of Bolt Stretch •
	Leak Testing Procedures • Documenting Joint Integrity Status
	Maintenance of Bolted Joints
1100 – 1215	Monitoring Strategies • Retorquing Intervals • Corrosion Prevention Practices
	Bolt Replacement Protocols
1215 – 1230	Break
	Case Studies & Failures
1230 - 1330	Real-World Flange Failure Examples • Analysis of Poor Torquing/Tensioning
	<i>Practices</i> • <i>Lessons Learned from Incidents</i> • <i>Corrective Action Development</i>
1330 - 1420	Hands-on Flange Assembly Workshop
	Complete Flange Bolting Under Supervision • Simulated Leak Testing •
	Documentation & Checklists • QA/QC Checks During Assembly
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:	Thursday, 23 rd of October 2025
	Advanced Bolting Challenges
0730 - 0830	Large Diameter Bolts • High-Temperature Joints • Cryogenic Sealing • Subsea
	Bolt Tensioning
	Design Considerations for Bolted Joints
0830 - 0930	Bolt Length & Grip Considerations • Joint Stiffness & Relaxation • Fatigue &
	Vibration Impacts • Expansion/Contraction Handling
0930 - 0945	Break
	Digital & Smart Bolting
0945 - 1100	Load-Sensing Bolts •Digital Torque & Tension Monitors • IoT Integration in
	Bolted Joints • Real-Time Condition Tracking
	Industry Applications & Standards Review
1100 – 1215	<i>Oil & Gas Pipelines • Pressure Vessels & Heat Exchangers • Wind Turbines &</i>
	Energy Sector • Offshore Platforms
1215 – 1230	Break
	Final Practical Assessment
1230 – 1345	Torquing Task with Error Analysis • Tensioning Sequence Execution • Joint
	Integrity Inspection • Report Preparation & Review
	Course Conclusion
1345 – 1400	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
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Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



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