COURSE OVERVIEW ME0833
Boilers & Balance of Plant (BOP) Maintenance (MD)

Course Title
Boilers & Balance of Plant (BOP) Maintenance (MD)

Course Date/Venue
July 06-10, 2026/TBA Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
ME0833

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

Course Description

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

This course is designed to provide participants with a detailed and up-to-date overview of Boilers & Balance of Plant (BOP) Maintenance (MD). It covers the boiler design fundamentals and BOP, boiler pressure parts and boiler tube failure mechanisms; the inspection and NDT of pressure parts and boiler water chemistry impact on reliability; the pressure part maintenance strategies, boiler casings and structural components; the boiler duct systems, expansion systems and boiler movements; the boiler mechanical auxiliaries, fans and draft systems and reliability-centered maintenance for boiler auxiliaries; and the boiler feed pump (BFP) fundamentals, boiler feed pump maintenance and troubleshooting.

During this interactive course, participants will learn the condensate pumps, condensate extraction systems and steam mechanical systems; the steam traps and condensate recovery systems; the valves used in boiler and steam systems, lubrication fundamentals, bearing technologies and applications; the bearing failure mechanisms, condition monitoring of bearings and rotating equipment reliability improvement; the maintenance of fans, pumps and auxiliary drives; the failure analysis, root cause analysis (RCA) and predictive and reliability-based maintenance; the outage planning and maintenance management; and the maintenance excellence and continuous improvement.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain an in-depth knowledge on boilers and balance of plant (BOP) maintenance (MD)
- Discuss boiler design fundamentals and BOP, boiler pressure parts and boiler tube failure mechanisms
- Carryout inspection and NDT of pressure parts and identify boiler water chemistry impact on reliability
- Apply pressure part maintenance strategies and recognize boiler casings and structural components, boiler duct systems and expansion systems and boiler movements
- Identify boiler mechanical auxiliaries and fans and draft systems and apply reliability-centered maintenance for boiler auxiliaries
- Discuss boiler feed pump (BFP) fundamentals and apply boiler feed pump maintenance and troubleshooting
- Recognize condensate pumps and condensate extraction systems, steam mechanical systems and steam traps and condensate recovery systems
- Discuss valves used in boiler and steam systems, lubrication fundamentals and bearing technologies and applications
- Recognize bearing failure mechanisms and apply condition monitoring of bearings and rotating equipment reliability improvement
- Employ maintenance of fans, pumps and auxiliary drives, failure analysis, root cause analysis (RCA) and predictive and reliability-based maintenance
- Implement outage planning and maintenance management as well as maintenance excellence and continuous improvement

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 on boilers and balance of plant (BOP) maintenance (MD) for boiler and power plant engineers, mechanical and maintenance engineers, boiler operators and shift supervisors, balance of plant (BOP) operations and maintenance personnel, reliability and asset integrity engineers, utilities and plant engineers, inspection and QA/QC engineers, maintenance technicians and supervisors, shutdown and turnaround personnel, technical managers responsible for boiler and auxiliary systems performance and reliability.

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.

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. Andrew Ladwig is a **Senior Process & Mechanical Maintenance Engineer** with over **25 years** of extensive experience within the **Oil & Gas**, **Refinery**, **Petrochemical & Power** industries. His expertise widely covers in the areas of **Boilers & Balance of Plant** (BOP), **Boiler Tube Failure Mechanisms**, **Boiler Feed Pump** Maintenance & Troubleshooting, **Ammonia Manufacturing & Process Troubleshooting**, **Distillation Towers**, **Crude Oil Distillation**, **Ammonia Storage & Loading** Systems, **Operational Excellence** in **Ammonia Plants**, **Fertilizer Storage** Management (Ammonia & Urea), **Fertilizer Manufacturing** Process Technology, **Sulphur Recovery**, Phenol Recovery & Extraction, **Refining Process & Petroleum Products**, **Refinery Planning & Economics**, **Hydrotreating & Hydro-processing**, **Separators** in **Oil & Gas** Industry, **Gas Testing & Energy** Isolations, **Industrial Liquid Mixing**, **Extractors**, **Fractionation**, **Water Purification**, **Water Transport** & Distribution, **Environmental Emission Control**, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Plant Performance**, **Plant Startup & Shutdown**, **Process Troubleshooting** Techniques and Oil & Gas Operation/Surface Facilities. Further, he is also well-versed in **Rotating Machinery** (**BRM**), **Rotating Equipment** Operation & Troubleshooting, Root Cause Analysis (**RCA**), **Process Plant** Shutdown, Turnaround & Troubleshooting, Planning & Scheduling **Shutdowns & Turnarounds**, Optimizing **Equipment Maintenance** & Replacement Decisions, **Maintenance Planning & Scheduling**, **Material Cataloguing**, Maintenance, Reliability & Asset Management Best Practices, **Storage Tanks Operations** & Measurements, **Tank** Inspection & Maintenance, **Pressure Vessel** Operation, **Flare & Relief** System, **Flaring System** Operation, **PSV** Inspection & Maintenance, **Centrifugal & Reciprocating Compressor**, **Screw Compressor** Troubleshooting, **Heat Exchanger** Overhaul & Testing, **Pipe Stress** Analysis, **Control Valves & Actuators**, **Vent & Relief System**, **Centrifugal & Reciprocating Pump** Installation & Repair, **Heat Exchanger** Troubleshooting & Maintenance, **Steam Trapping & Control**, **Control & ESD** System and Detailed Engineering Drawings, Codes & Standards.

During his career life, Mr. Ladwig has gained his practical experience through his various significant positions and dedication as the **Mechanical Engineer**, **Project Engineer**, **Reliability & Maintenance Engineer**, **Maintenance Support Engineer**, **Process Engineer**, **HSE Supervisor**, **Warehouse Manager**, **Quality Manager**, **Business Analyst**, **Senior Process Controller**, **Process Controller**, **Safety Officer**, **Mechanical Technician**, **Senior Lecturer** and **Senior Consultant/Trainer** for various companies such as the Sasol Ltd., Sasol Wax, Sasol Synfuels, just to name a few.

Mr. Ladwig has a **Bachelor's** degree in **Chemical Engineering** and a **Diploma** in **Mechanical Engineering**. 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.

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.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

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: ***Monday, 06th of July 2026***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Boiler Design Fundamentals & BOP Overview*** *Boiler Types and Operating Principles • Steam Generation Cycle and Heat Transfer Mechanisms • Boiler-BOP Interfaces and System Boundaries • Reliability and Availability Considerations*
0930 – 0945	*Break*
0945 – 1030	***Boiler Pressure Parts (Mechanical Integrity)*** *Water Walls, Furnace Tubes and Risers • Superheaters, Reheaters and Economizers • Drum Internals and Steam Separation Equipment • Pressure Part Life Assessment and Integrity Management*
1030 – 1130	***Boiler Tube Failure Mechanisms*** *Overheating and Creep Damage • Corrosion and Erosion Failures • Thermal Fatigue and Stress Cracking • Flow-Accelerated Corrosion (FAC)*
1130 – 1215	***Inspection & NDT of Pressure Parts*** *Visual Inspection Techniques • Ultrasonic Thickness Measurement • Magnetic Particle and Dye Penetrant Testing • Advanced NDT and Remaining Life Evaluation*
1215 – 1230	*Break*
1230 – 1330	***Boiler Water Chemistry Impact on Reliability*** *Water Quality Requirements • Scale Formation and Deposition • Corrosion Control Strategies • Chemistry Monitoring and Corrective Actions*

1330 – 1420	***Pressure Part Maintenance Strategies*** *Preventive Maintenance Planning • Tube Leak Prevention Programs • Outage Inspection Requirements • Repair and Replacement Methodologies*
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 One*

Day 2: ***Tuesday, 07th of July 2026***

0730 – 0830	***Boiler Casings & Structural Components*** *Boiler Casing Design and Functions • Structural Supports and Load Paths • Common Casing Deterioration Mechanisms • Inspection and Repair Techniques*
0830 – 0930	***Boiler Duct Systems*** *Air Ducts and Gas Ducts • Duct Expansion Allowances • Erosion and Corrosion Management • Leakage Detection and Control*
0930 – 0945	*Break*
0945 – 1100	***Expansion Systems & Boiler Movements*** *Thermal Expansion Principles • Expansion Joints and Seals • Sliding Supports and Guides • Monitoring Boiler Movement During Operation*
1100 – 1215	***Boiler Mechanical Auxiliaries*** *Soot Blowers and Cleaning Systems • Air Preheaters and Regenerative Equipment • Dampers and Flow Control Devices • Ash Handling Interfaces*
1215 – 1230	*Break*
1230 – 1330	***Fans & Draft Systems*** *Forced Draft (FD) Fans • Induced Draft (ID) Fans • Primary Air (PA) Fans • Fan Maintenance and Troubleshooting*
1330 – 1420	***Reliability-Centered Maintenance for Boiler Auxiliaries*** *Criticality Assessment • Maintenance Optimization Techniques • Spare Parts Management • Reliability Performance Indicators*
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, 08th of July 2026***

0730 – 0830	***Boiler Feed Pump (BFP) Fundamentals*** *BFP Construction and Operating Principles • Multistage Centrifugal Pump Design • Hydraulic Performance Characteristics • Common Operating Problems*
0830 – 0930	***Boiler Feed Pump Maintenance & Troubleshooting*** *Alignment and Balancing Requirements • Seal Systems and Leakage Control • Vibration Analysis Applications • Failure Prevention Techniques*
0930 – 0945	*Break*
0945 – 1100	***Condensate Pumps & Condensate Extraction Systems*** *Condensate System Configuration • Pump Performance Monitoring • Cavitation Prevention Methods • Maintenance Best Practices*
1100 – 1215	***Steam Mechanical Systems*** *Main Steam Piping Systems • Steam Distribution Equipment • Steam Pressure Control Devices • Thermal Expansion Management*

1215 – 1230	Break
1230 – 1330	***Steam Traps & Condensate Recovery Systems*** *Steam Trap Operating Principles • Steam Trap Failure Modes • Condensate Recovery Optimization • Energy Efficiency Improvements*
1330 – 1420	***Valves Used in Boiler & Steam Systems*** *Isolation and Control Valves • Safety and Relief Valves • Valve Maintenance Practices • Diagnostic and Testing Procedures*
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*

Day 4: Thursday, 09th of July 2026

0730 – 0830	***Lubrication Fundamentals*** *Functions of Lubrication • Lubricant Properties and Selection • Contamination Control Techniques • Lubrication Management Programs*
0830 – 0930	***Bearing Technologies & Applications*** *Rolling Element Bearings • Journal and Sleeve Bearings • Thrust Bearings • Bearing Selection Criteria*
0930 – 0945	*Break*
0945 – 1100	***Bearing Failure Mechanisms*** *Lubrication-Related Failures • Fatigue and Wear Mechanisms • Electrical Damage and Corrosion • Installation-Induced Failures*
1100 – 1215	***Condition Monitoring of Bearings*** *Vibration Monitoring Techniques • Oil Analysis Programs • Thermography Applications • Ultrasound Inspection Methods*
1215 – 1230	*Break*
1230 – 1330	***Rotating Equipment Reliability Improvement*** *Precision Alignment Practices • Dynamic Balancing Techniques • Soft Foot Correction • Reliability Enhancement Methods*
1330 – 1420	***Maintenance of Fans, Pumps & Auxiliary Drives*** *Couplings and Drive Systems • Mechanical Seal Reliability • Motor-Pump Interface Management • Predictive Maintenance Implementation*
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: Friday, 10th of July 2026

0730 – 0830	***Failure Analysis Fundamentals*** *Failure Mechanisms in Boilers and BOP • Evidence Collection and Preservation • Failure Classification Methodologies • Failure Reporting Requirements*
0830 – 0930	***Root Cause Analysis (RCA)*** *RCA Methodologies and Frameworks • 5-Why Analysis Technique • Fishbone (Ishikawa) Diagrams • Cause-and-Effect Relationships*
0930 – 0945	*Break*
0945 – 1100	***Boiler & BOP Case Studies*** *Boiler Tube Failure Investigations • Pump and Bearing Failure Cases • Fan and Auxiliary Equipment Failures • Lessons Learned and Corrective Actions*

1100 – 1215	***Predictive & Reliability-Based Maintenance*** *Predictive Maintenance Technologies • Reliability-Centered Maintenance (RCM) • Risk-Based Inspection (RBI) • Asset Integrity Management*
1215 – 1230	*Break*
1230 – 1300	***Outage Planning & Maintenance Management*** *Major Outage Planning Processes • Work Scope Development • Resource and Contractor Management • Quality Assurance and Control*
1300 – 1345	***Maintenance Excellence & Continuous Improvement*** *Key Performance Indicators (KPIs) • Reliability Culture Development • Maintenance Benchmarking • Continuous Improvement Strategies*
1345 – 1400	***Course Conclusion*** *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*

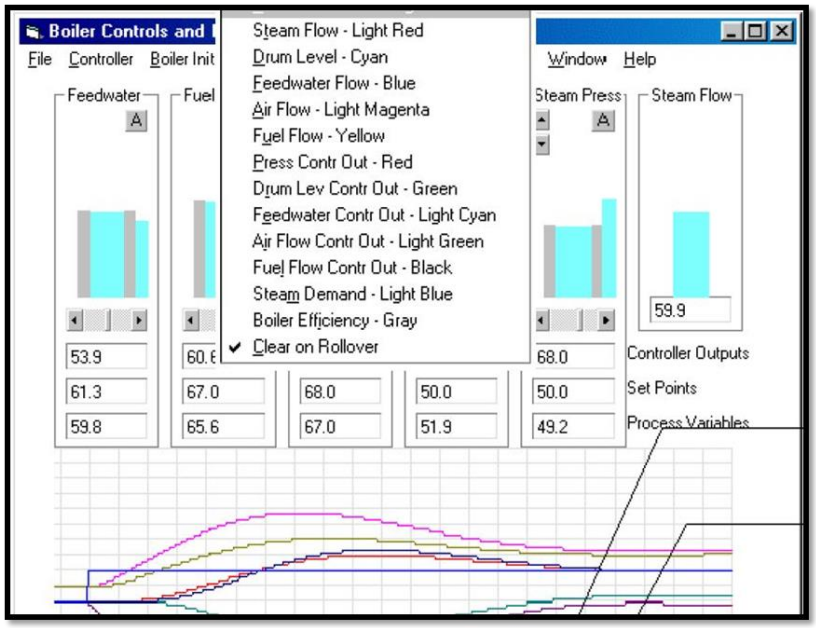
Training Deliverables

Upon completion, participants will be able to:

- Assess the mechanical integrity of boiler pressure parts and BOP equipment
- Develop effective maintenance programs for boilers, pumps, fans, steam systems and auxiliaries
- Apply lubrication and bearing reliability best practices
- Conduct inspections, diagnostics, and condition monitoring activities
- Perform root cause failure analysis and implement corrective actions
- Improve equipment reliability, availability, and maintenance effectiveness across boiler and BOP systems

Simulator (Hands-on Practical Sessions)

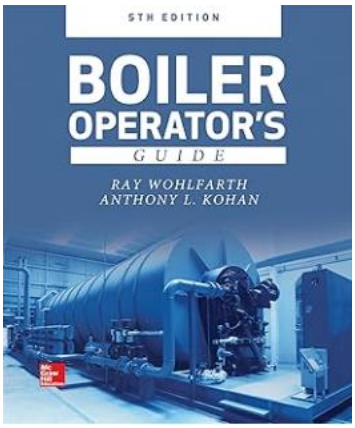
Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the simulator "Win Boiler Sim".



Win Boiler Sim

Book(s)

As part of the course kit, the following e-book will be given to all participants:



Title : Boiler Operator's Guide
ISBN : 978-1260026993
Author : Ray Wohlfarth and Anthony L. Kohan
Publisher : McGraw-Hill
Pages : 752 pages

Course Coordinator

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