

COURSE OVERVIEW FE0998
Refinery Fired Heater & Boilers Inspection

Course Title

Refinery Fired Heater & Boilers Inspection

Course Date/Venue

Session 1: January 12-16, 2025/Boardroom
 1, Elite Byblos Hotel Al Barsha,
 Sheikh Zayed Road, Dubai, UAE
 Session 2: July 14-18, 2025/Fujairah Meeting
 Room, Grand Millennium Al
 Wahda Hotel, Abu Dhabi, UAE



Course Reference

FE0998



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 covers the inspection practices for fired boilers, process heaters and furnaces used in the petroleum refineries and petrochemical plants. It is focused to improve equipment reliability and plant safety and provide inspection practices that accurately capture appropriate data both onstream and off-stream to assess current and future performance of the equipment.



Further, the course will also discuss the types and common heater and boiler designs; the heater, furnace and boiler mechanical reliability; the inspection of fired boilers, fired heaters and furnaces; the inspection qualifications and corrosion control documents (CCDs); the damage mechanisms; the proper boiler and heater inspection frequency and timing of inspections; the safety precautions to avoid PTA SCC in stainless steel tubes, preparatory work and cleaning; the outage inspection; the radiographic examination, borescope, videoprobe and hardness measurements; and the dye penetrant and magnetic particle examination.



During this interactive course, participants will learn the in situ metallography and replication, detailed examination and destructive testing of tube samples; testing of tubeskin thermocouples, magnetic test for carburization, hammer testing, inspection of steam-methane reformer tubes and inspection of pigtailed; the boiler outage inspection for piping, drums, water heaters, superheater header and tubes; the onstream inspection, typical inspection activities and external tube cleaning and pre-shutdown inspection; the tube reliability assessment, minimum thickness and stress rupture, creep rupture life; the method of inspection of foundations, settings and other appurtenances; the systematic repair on heater and furnaces and boilers; and the material verification, record and reports.

Course Objectives

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

- Apply and gain an in-depth knowledge on fired boilers and heaters inspection in accordance with API 573
- Discuss the types and common heater and boiler designs
- Recognize heater, furnace and boiler mechanical reliability covering integrity reliability programs and potential consequence of a tube rupture
- Inspect fired boilers, fired heaters and furnaces as well as review inspection qualifications and corrosion control documents (CCDs)
- Identify damage mechanisms covering deterioration of tubes and boiler tubes
- Apply proper boiler and heater inspection frequency and timing of inspections
- Employ safety precautions to avoid PTA SCC in stainless steel tubes, preparatory work and cleaning
- Carryout outage inspection covering visual inspection of heating coils, wall thickness measurements, tube diameter, circumference, sag and bow measurements, pit depth measurements, intelligent pigs and in-line inspection devices
- Perform radiographic examination, borescope, videoprobe and hardness measurements
- Illustrate dye penetrant and magnetic particle examination, in situ metallography and replication, detailed examination and destructive testing of tube samples
- Test tubeskin thermocouples, magnetic test for carburization, hammer testing, inspection of steam-methane reformer tubes and inspection of pigtailed
- Apply boiler outage inspection for piping, drums, water heaters, superheater header and tubes as well as onstream inspection, typical inspection activities and external tube cleaning and pre-shutdown inspection
- Carryout tube reliability assessment, minimum thickness and stress rupture, creep rupture life
- Implement the method of inspection of foundations, settings and other appurtenances
- Perform systematic repair on heater and furnaces and boilers
- Apply material verification, record and reports

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 fired boilers and heaters inspection in accordance with API 573 for designers, inspection engineers, maintenance engineers, plant inspectors, mechanical engineers and process engineers in the chemical process, refining and petrochemical industries.

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.

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 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:

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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.

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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 **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. Karl Thanasis, PEng, MSc, MBA, BSc, is **Senior Mechanical & Inspection Maintenance Engineer** with over **30 years** of extensive industrial experience. His wide expertise includes **Furnace & Boiler Mechanical Reliability, Boilers, Process Fired Heaters, Air Preheaters**, Induced Draft Fans, All **Heaters Piping Work, Piping & Pipeline Design**, Construction, Inspection, Pigging, Maintenance, Repair & Integrity Assessment, Refractory Casting, **Heater Fabrication, Thermal & Fired Heater Design, Heat Exchangers**, Heat Transfer, Coolers, **Tank**

Inspection & Repair, Tank Inspection & Reconstruction, Shutdown, Turnaround & Outages, Maintenance & Reliability Management, Mechanical Maintenance Planning, Scheduling & Work Control, Advanced Techniques in Maintenance Management, Predictive & Preventive Maintenance, Maintenance & Operation Cost Reduction Techniques, Reliability Centered Maintenance (RCM), Machinery Failure Analysis, Rotating Equipment Reliability Optimization & Continuous Improvement, Material Cataloguing, Mechanical & Rotating Equipment Troubleshooting & Maintenance, Root Cause Analysis & Reliability Improvement, Condition Monitoring, Root Cause Failure Analysis (RCFA), Steam Generation, Steam Turbines, Power Generator Plants, Gas Turbines, Combined Cycle Plants, Power Plant Performance, Efficiency & Optimization, Storage Tank Design & Fabrication, Thermal Power Plant Management, Boiler & Steam System Management, Pump Operation & Maintenance, Chiller & Chiller Plant Design & Installation, Pressure Vessel, Safety Relief Valve Sizing & Selection, Valve Disassembling & Repair, Pressure Relief Devices (PSV), Hydraulic & Pneumatic Maintenance, Advanced Valve Technology, Pressure Vessel Design & Fabrication, Pumps, Turbo-Generator, Turbine Shaft Alignment, Lubrication, Mechanical Seals, Packing, Blowers, Bearing Installation, Couplings, Clutches and Gears. Further, he is also versed in **Wastewater Treatment Technology, Networking System, Water Network Design, Industrial Water Treatment** in Refineries & Petrochemical Plants, **Piping System, Water Movement, Water Filtering, Mud Pumping, Sludge Treatment and Drying, Aerobic Process of Water Treatment** that includes **Aeration, Sedimentation and Chlorination Tanks**. His strong background also includes **Design and Sizing** of all **Waste Water Treatment Plant Associated Equipment** such as **Sludge Pumps, Filters, Metering Pumps, Aerators and Sludge Decanters**.

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager, Plant Manager, Area Manager - Equipment Construction, Construction Superintendent, Project Engineer** and **Design Engineer**. His duties covered **Plant Preliminary Design, Plant Operation, Write-up of Capital Proposal, Investment Approval, Bid Evaluation, Technical Contract Write-up, Construction and Sub-contractor Follow up, Lab Analysis, Sludge Drying and Management of Sludge Odor and Removal**. He has worked in various companies worldwide in the **USA, Germany, England and Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA and Greece** and has a **Master and Bachelor** degrees in **Mechanical Engineering with Honours** from the **Purdue University** and **SIU in USA** respectively as well as an **MBA** from the **University of Phoenix** in **USA**. Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management (ILM)** a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, seminars, workshops and conferences worldwide.

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 – 0930	Introduction to API 573: Inspection of Fired Boilers & Heaters
0930 – 0945	Break
0945 – 1030	Common Heater & Boiler Designs Types of Heaters • Types of Boilers
1215 – 1230	Break
1230 – 1330	Heater, Furnace & Boiler Mechanical Reliability Integrity Reliability Programs • Potential Consequence of a Tube Rupture • Purpose of Inspection • Inspection of Fired Boilers
1330 – 1420	Heater, Furnace & Boiler Mechanical Reliability (cont'd) Inspection of Fired Heaters & Furnaces • Inspection Qualifications • Corrosion Control Documents (CCDs)
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2

0730 – 0930	Damage Mechanisms Deterioration of Tubes • Deterioration of Boiler Tubes • Damage Mechanisms of Other Components
0930 – 0945	Break
0945 – 1215	Frequency & Timing of Inspections Boiler Inspection Frequency • Heater Inspection Frequency
1215 – 1230	Break
1230 – 1330	Safety Precautions, Preparatory Work & Cleaning Safety • General Preparatory Work
1330 – 1420	Safety Precautions, Preparatory Work & Cleaning (cont'd) Precautions to Avoid PTA SCC in Stainless Steel Tubes • Cleaning
1420 – 1430	Recap
1430	Lunch & End of Day Two

Day 3

0730 – 0930	Outage Inspection Programs Visual Inspection of Heating Coils • Wall Thickness Measurements • Tube Diameter, Circumference, Sag & Bow Measurements • Pit Depth Measurements • Intelligent Pigs & In-line Inspection Devices • Radiographic Examination • Borescope & Videoprobe • Hardness Measurements
0930 – 0945	Break
0945 – 1215	Outage Inspection Programs (cont'd) Dye Penetrant & Magnetic Particle Examination • In Situ Metallography & Replication • Detailed Examination & Destructive Testing of Tube Samples • Testing of Tubeskin Thermocouples • Magnetic Test for Carburization • Hammer Testing • Inspection of Steam-Methane Reformer Tubes • Inspection of Pigtailes



1215 - 1230	Break
1230 - 1330	Boiler Outage Inspection Piping • Drums
1330 - 1420	Boiler Outage Inspection (cont'd) Water Headers • Superheater Header • Tubes
1420 - 1430	Recap
1430	Lunch & End of Day Three

Day 4

0730 - 0930	Onstream Inspection Programs Typical Inspection Activities
0930 - 0945	Break
0945 - 1215	Onstream Inspection Programs (cont'd) External Tube Cleaning • Pre-Shutdown Inspection
1215 - 1230	Break
1230 - 1330	Tube Reliability Assessment Minimum Thickness & Stress Rupture
1330 - 1420	Tube Reliability Assessment (cont'd) Creep Rupture Life
1420 - 1430	Recap
1430	Lunch & End of Day Four

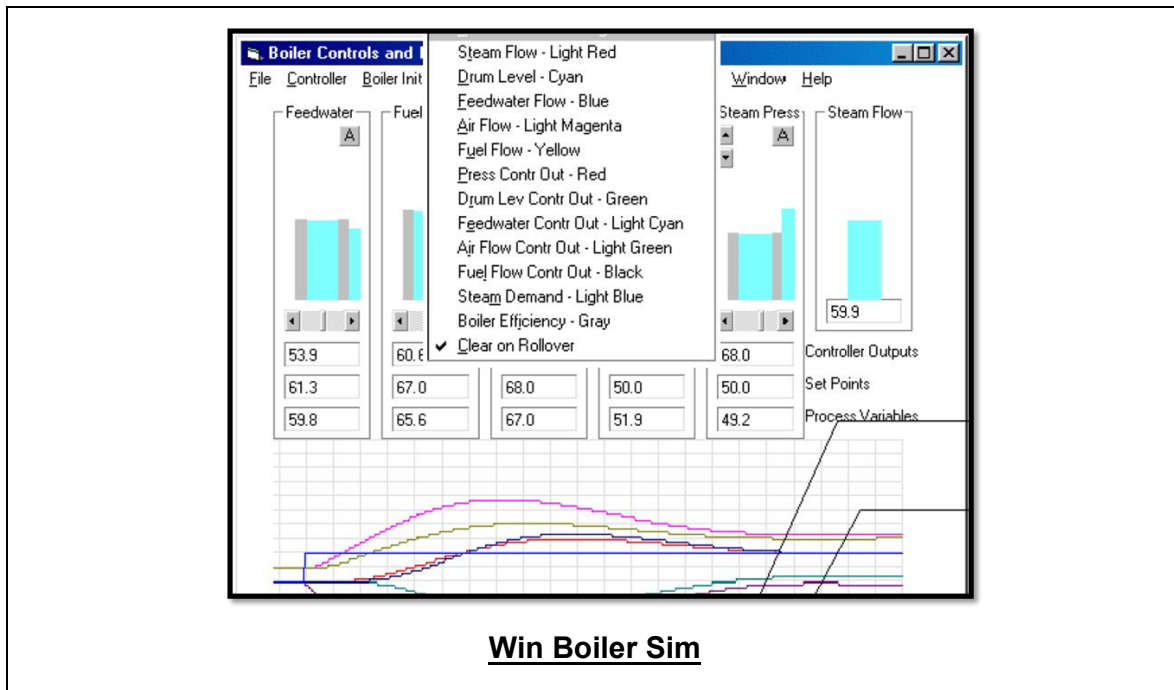
Day 5

0730 - 0930	Method of Inspection of Foundations, Settings & Other Appurtenances Foundations • Structural Supports • Setting, Exterior & Casing • Refractory Lining & Insulation
0930 - 0945	Break
0945 - 1100	Method of Inspection of Foundations, Settings & Other Appurtenances (cont'd) Tube Supports • Visual Inspection of Auxiliary Equipment • Stacks
1100 - 1230	Repairs Heater & Furnaces • Boilers • Material Verification
1230 - 1245	Break
1245 - 1415	Record & Reports Retention • Contents
1415 - 1430	Course Conclusion
1430 - 1445	POST-TEST
1445 - 1430	Presentation of Course Certificates
1430	Lunch & End of Course



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”.



Course Coordinator

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