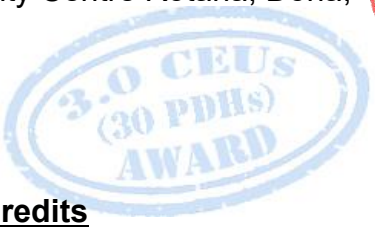
COURSE OVERVIEW ME1124
Certified Thermal Power Plant Chemist & Boiler Engineers

Course Title
Certified Thermal Power Plant Chemist & Boiler Engineers

Course Date/Venue
Session 1: August 03-07, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
Session 2: November 16-20, 2025/Meeting Plus 9, City Centre Rotana, Doha, Qatar



Course Reference
ME1124

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 Certified Thermal Power Plant Chemist & Boiler Engineers. It covers the types, basic working principle and key components of thermal power plants; the types of boilers used in thermal plants, boiler mounting and accessories, basic heat transfer principles, steam generation and thermodynamics; the water chemistry in power plants, chemistry of fuel and combustion, chemical dosing systems and plant layout and process flow diagrams; and the boiler water chemistry control, cooling water treatment and laboratory analysis techniques.

Further, the course will also discuss the water treatment units covering RO, UF and EDI system working principles and mixed bed polishers; troubleshooting water treatment systems and membrane fouling and cleaning; the corrosion monitoring and mitigation, online monitoring systems, steam cycle chemistry at start-up and shutdown chemistry; the condensate and feedwater system chemistry and heat balance and efficiency calculations; and the flue gas analysis and optimization and boiler tuning practices.

During this interactive course, participants will learn the sludge and scale management, sampling techniques and best practices; the environmental regulations for power plants and effluent treatment plant (ETP) operations; the air pollution and flue gas control, waste management in power plants and emergency handling of chemical spills; the incident investigation and root cause analysis, steam purity and turbine protection and condition monitoring and failure analysis; and the water chemistry audit procedures, operational data correlation, benchmarks and KPIs and energy and water conservation practices.

Course Objectives

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

- Apply and gain an in-depth knowledge on thermal power plant
- Identify the types, basic working principle and key components of thermal power plants
- Recognize the types of boilers used in thermal plants, boiler mounting and accessories, basic heat transfer principles, steam generation and thermodynamics
- Discuss water chemistry in power plants, chemistry of fuel and combustion, chemical dosing systems and plant layout and process flow diagrams
- Carryout boiler water chemistry control, cooling water treatment and laboratory analysis techniques
- Identify water treatment units covering RO, UF and EDI system working principles, mixed bed polishers as well as troubleshoot water treatment systems and apply membrane fouling and cleaning
- Illustrate corrosion monitoring and mitigation, online monitoring systems, steam cycle chemistry at start-up and shutdown chemistry
- Discuss condensate and feedwater system chemistry and apply heat balance and efficiency calculations, flue gas analysis and optimization and boiler tuning practices
- Implement sludge and scale management, sampling techniques and best practices, environmental regulations for power plants and effluent treatment plant (ETP) operations
- Employ air pollution and flue gas control, waste management in power plants and emergency handling of chemical spills
- Apply incident investigation and root cause analysis, steam purity and turbine protection and condition monitoring and failure analysis
- Develop water chemistry audit procedures and apply operational data correlation, benchmarks and KPIs and energy and water conservation practices

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 thermal power plant for boiler engineers, mechanical engineers, electrical engineers, instrumentation engineers, control room engineers/operators, O&M (operations and maintenance) engineers, maintenance supervisors 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

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. Karl Thanasis, PEng, MSc, MBA, BSc, is **Senior Mechanical & Maintenance Engineer** with over **30 years** of extensive industrial experience within the **Power & Water Utilities** and other **Energy Sectors**. His wide expertise includes **District Cooling Plant**, **District Cooling Plant Operations**, **HVAC** Basics, **HVAC&R**, **KOTZA**, **Refrigeration**, **Modern HVAC & Refrigeration Systems Design, Utilization, Operation & Effective Maintenance, Control Valve & Actuators**, **Fire Safe Valves**, **Piping & Pipeline**, Maintenance, Repair, **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**, **Boilers**, **Process Fired Heaters**, Air Preheaters, Induced Draft Fans, All Heaters Piping Work, Refractory Casting, Heater Fabrication, Thermal & Fired Heater Design, **Heat Exchangers**, Heat Transfer, Coolers, **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's** and **Bachelor's** degree 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.

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 Fee

Dubai	**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.
Doha	**US$ 6,000** per Delegate. 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 workshop 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 Thermal Power Plants*** *Types of Thermal Power Plants (Coal, Gas, Oil) • Basic Working Principle (Rankine Cycle) • Key Components Overview • Power Generation Process Flow*
0930 – 0945	*Break*
0945 – 1030	***Boiler Fundamentals*** *Types of Boilers Used in Thermal Plants • Boiler Mounting and Accessories • Basic Heat Transfer Principles • Steam Generation and Thermodynamics*
1030 – 1130	***Water Chemistry in Power Plants*** *Water Quality Standards (ASME, EPRI) • Impurities in Feedwater • Scaling and Corrosion Mechanisms • Importance of Demineralized Water*
1130 – 1215	***Chemistry of Fuel & Combustion*** *Coal, Oil and Gas Fuel Analysis • Proximate and Ultimate Analysis • Combustion Reactions and Efficiency • Flue Gas Composition and Analysis*
1215 – 1230	*Break*
1230 – 1330	***Overview of Chemical Dosing Systems*** *Dosing Types (Manual, Automatic) • Chemicals Used in Boilers (Phosphate, Hydrazine) • Online Dosing Methods • Safety in Chemical Handling*

1330 – 1420	***Plant Layout & Process Flow Diagrams*** *Reading and Interpreting PFDs and P&IDs • Key Flow Lines (Steam, Condensate, Fuel) • Control Systems Overview (DCS/PLC) • Integration of Water Treatment Plants*
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

0730 – 0830	***Boiler Water Chemistry Control*** *Boiler Water Parameters (pH, Conductivity, Phosphate) • Internal versus External Treatment • High-Pressure versus Low-Pressure Boiler Chemistry • Blowdown Techniques*
0830 – 0930	***Cooling Water Treatment*** *Open versus Closed Loop Systems • Scaling, Fouling and Biological Control • Chemical Additives (Biocides, Anti-Scalants) • Monitoring and Control Parameters*
0930 – 0945	*Break*
0945 – 1100	***Laboratory Analysis Techniques*** *Titration Methods (Alkalinity, Hardness) • Spectrophotometry and Colorimetry • Ion Chromatography and Conductivity Tests • DO, Silica and Phosphate Analysis*
1100 – 1215	***Water Treatment Units*** *RO, UF, and EDI System Working Principles • Mixed Bed Polishers • Troubleshooting Water Treatment Systems • Membrane Fouling and Cleaning*
1215 – 1230	*Break*
1230 – 1330	***Corrosion Monitoring & Mitigation*** *Corrosion Types in Thermal Plants • Coupons and Probes for Detection • Anodic and Cathodic Protection • Inhibitors and Neutralizing Agents*
1330 – 1420	***Online Monitoring Systems*** *Conductivity and pH Analyzers • Silica and Sodium Analyzers • Continuous Emission Monitoring Systems (CEMS) • Integration with Plant SCADA/DCS*
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

0730 – 0830	***Steam Cycle Chemistry*** *Phosphate and AVT Programs • Carryover and Its Impact • Silica and Sodium Contamination • Condensate Polishing Units (CPU)*
0830 – 0930	***Start-Up & Shutdown Chemistry*** *Boiler Startup Procedures (Chemical Pre-Cleaning) • Lay-Up Techniques (Wet and Dry) • Chemical Cleaning of Boilers • Thermal Transients and Water Chemistry*
0930 – 0945	*Break*

0945 – 1100	***Condensate & Feedwater System Chemistry*** *Oxygen Removal Techniques • Volatile versus Non-Volatile Treatments • pH Control in Condensate • Monitoring and Alarm Systems*
1100 – 1215	***Boiler Efficiency & Losses*** *Heat Balance and Efficiency Calculations • Flue Gas Analysis and Optimization • Losses Due to Moisture, Unburnt Carbon • Boiler Tuning Practices*
1215 – 1230	*Break*
1230 – 1330	***Sludge & Scale Management*** *Types of Deposits in Boiler Tubes • Chemical Cleaning Schedules • Scale Inhibitors and Dispersants • Sludge Conditioning*
1330 – 1420	***Sampling Techniques & Best Practices*** *Isokinetic Sampling • Grab versus Continuous Sampling • Location and Timing of Samples • Preservation and Transportation of Samples*
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

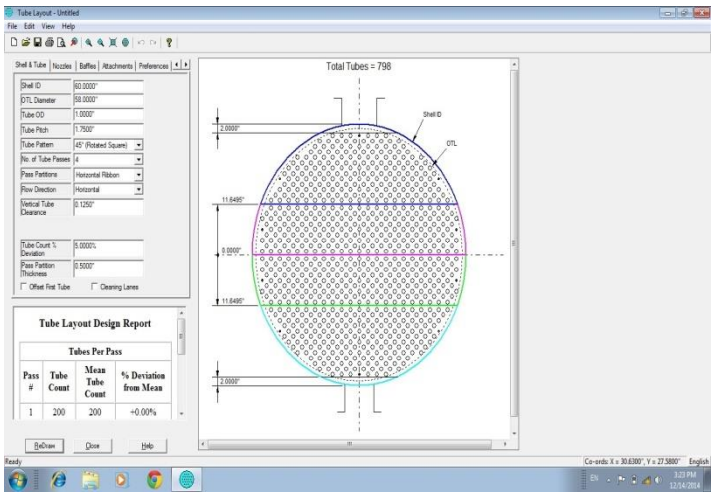
0730 – 0830	***Environmental Regulations for Power Plants*** *National and International Emission Standards • Water Discharge Norms and ZLD • EPA and CPCB Norms • Pollution Control Boards Reporting*
0830 – 0930	***Effluent Treatment Plant (ETP) Operations*** *Process Steps (Equalization, Neutralization) • Chemical Coagulants and Flocculants • Sludge Dewatering Systems • Compliance Monitoring*
0930 – 0945	*Break*
0945 – 1100	***Air Pollution & Flue Gas Control*** *NOx, SOx, CO_2 Control Techniques • ESPs, Scrubbers and Bag Filters • Mercury and Particulate Matter Control • Emission Trading and Carbon Credits*
1100 – 1215	***Waste Management in Power Plants*** *Ash Handling and Disposal • Fly Ash Utilization (Cement, Bricks) • Chemical Waste Disposal • Safe Storage of Hazardous Materials*
1215 – 1230	*Break*
1230 – 1330	***Emergency Handling of Chemical Spills*** *Safety Protocols and PPE • Spill Kits and Containment • MSDS and Emergency Response • Neutralization and Disposal*
1330 – 1420	***Incident Investigation & Root Cause Analysis*** *Incident Reporting Formats • Common Chemical Accidents • Root Cause Analysis (5-Why, Fishbone) • Lessons Learned and Corrective Action*
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

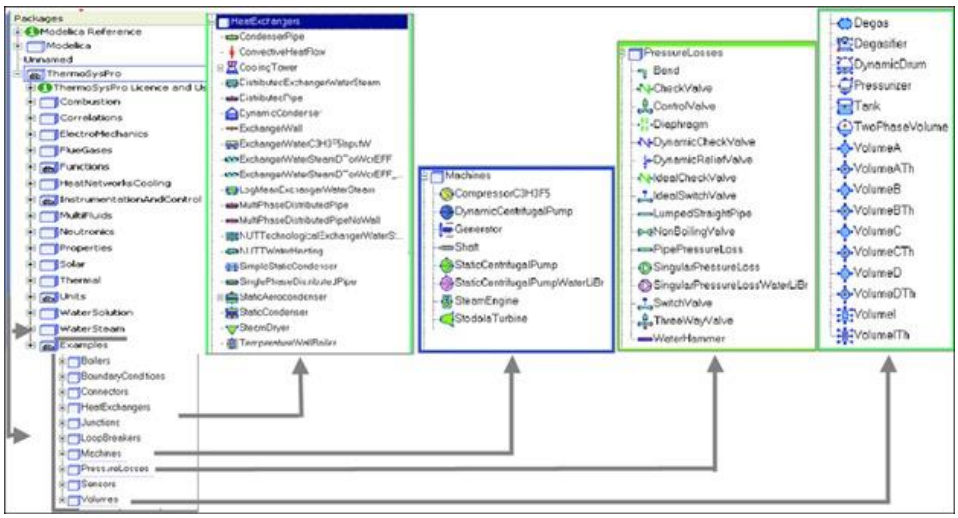
0730 – 0930	***High Pressure Boiler Chemistry Challenges*** *All Volatile Treatment (AVT) – Oxidizing/Reducing • Combined Cycle Power Plant (CCPP) Chemistry • HRSG Chemistry • Case Studies and Troubleshooting*
0930 – 0945	*Break*
0945 – 1100	***Steam Purity & Turbine Protection*** *Steam Purity Standards • Sodium and Silica Intrusion Impacts • Turbine Washing and Damage Prevention • Turbine Metallurgy and Chemistry Interface*
1100 – 1215	***Condition Monitoring & Failure Analysis*** *Boiler Tube Failure Types (Corrosion, Creep, Fatigue) • Root Cause Identification • NDT Techniques for Boiler Components • Case Study Reviews*
1215 – 1230	*Break*
1230 – 1345	***Performance Audits & Optimization*** *Water Chemistry Audit Procedures • Operational Data Correlation • Benchmarks and KPIs • Energy and Water Conservation Practices*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t Topics that were Covered During the Course*
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 simulator "Heat Exchanger Tube Layout" and "ThermoSysPro".



Heat Exchanger Tube Layout Simulator



ThermoSysPro

Course Coordinator

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