

**COURSE OVERVIEW ME0529**  
**Cooling Tower: Operation, Maintenance and Troubleshooting**

**Course Title**

Cooling Tower: Operation, Maintenance and Troubleshooting

**Course Date/Venue**

December 15-19, 2024/TBA Meeting Room, Doubletree Hilton Hotel, Doha, Qatar

**Course Reference**

ME0529

**Course Duration/Credits**

Five days/3.0 CEUs/30 PDHs

**Course Date/Venue**

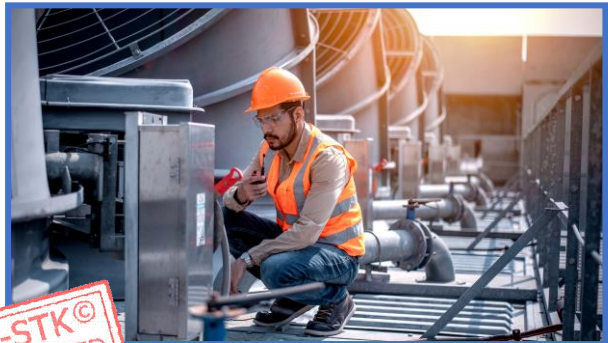


***This practical and highly-interactive course includes real-life case studies where participants will be engaged in a series of interactive small groups and class workshop.***

This course is designed to provide participants with a detailed and up-to-date overview of Cooling Tower: Operation, Maintenance and Troubleshooting. It covers the types, applications and significance of cooling towers in industrial cooling systems; the basic principles of cooling tower operation and the components of cooling towers; the cooling tower performance and efficiency metrics, operating conditions and variables as well as environmental considerations and compliance; the importance of water quality in cooling tower operations; the scaling, corrosion and biological growth prevention; the water treatment equipment and technology; and the conductivity and pH control, guidelines for prevention and control of legionella in cooling towers.



During this interactive course, participants will learn the daily, weekly and monthly routine maintenance practices; the visual inspections, vibration analysis and thermal imaging; the proper maintenance of cooling tower components; the predictive versus preventive maintenance; the record keeping, documentation and safety practices in maintenance; the common cooling tower problems and troubleshooting water quality issues; the mechanical and structural troubleshooting, emergency response and disaster recovery; the upgrades and retrofitting including techniques to reduce energy consumption and improve efficiency; and the advanced water treatment technologies and emerging technologies of cooling water.



### Course Objectives

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

- Operate, maintain and troubleshoot cooling tower in a professional manner
- Identify the types, applications and significance of cooling towers in industrial cooling systems
- Discuss the basic principles of cooling tower operation and the components of cooling towers
- Carryout cooling tower performance and efficiency metrics, operating conditions and variables as well as environmental considerations and compliance
- Discuss the importance of water quality in cooling tower operations
- Apply scaling, corrosion and biological growth prevention including water treatment equipment and technology
- Carryout conductivity and pH control as well as the guidelines for prevention and control of legionella in cooling towers
- Apply daily, weekly and monthly routine maintenance practices
- Employ visual inspections, vibration analysis and thermal imaging including proper maintenance of cooling tower components
- Differentiate predictive versus preventive maintenance and carryout record keeping, documentation and safety practices in maintenance
- Identify common cooling tower problems and troubleshoot water quality issues
- Apply mechanical and structural troubleshooting, emergency response and disaster recovery
- Implement upgrades and retrofitting including techniques to reduce energy consumption and improve efficiency
- Discuss advanced water treatment technologies as well as the emerging technologies of cooling water

### 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 on the operation, maintenance and troubleshooting of cooling tower for plant engineers, operation staff, supervisory personnel concerned with the selection, supervision, operation and maintenance of cooling towers and capital equipment for industrial, utility, institutional and commercial plants. Those involved in design engineering, field technical service and related problems solving will also benefit from this course.

### Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course 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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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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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.

### Course Fee

**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 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 Engineer** with over **25 years** of extensive experience within the **Oil & Gas, Refinery, Petrochemical & Power** industries. His expertise widely covers in the areas of **Ammonia Manufacturing & Process Troubleshooting, Distillation Towers, Crude Oil Distillation, Fundamentals of Distillation for Engineers, Distillation Operation and Troubleshooting, Advanced Distillation Troubleshooting, Distillation Technology, Vacuum Distillation, Ammonia Storage & Loading Systems, Ammonia Plant Operation, Troubleshooting & Optimization, Ammonia Recovery, Ammonia Plant Safety, Hazard of Ammonia Handling, Storage & Shipping, Operational Excellence in Ammonia Plants, Fertilizer**

**Storage Management (Ammonia & Urea), Fertilizer Manufacturing Process Technology, Sulphur Recovery, Phenol Recovery & Extraction, Wax Sweating & Blending, Petrochemical & Fertilizer Plants, Nitrogen Fertilizer Production, Petroleum Industry Process Engineering, Refining Process & Petroleum Products, Refinery Planning & Economics, Safe Refinery Operations, Hydrotreating & Hydro-processing, Separators in Oil & Gas Industry, Gas Testing & Energy Isolations, Gas Liquor Separation, Industrial Liquid Mixing, Wax Bleachers, Extractors, Fractionation, Operation & Control of Distillation, Process of Crude ATM & Vacuum Distillation Unit, Water Purification, Water Transport & Distribution, Steam & Electricity, Flame Arrestors, Coal Processing, Environmental Emission Control, R&D of Wax Blending, Wax Molding/Slabbing, Industrial Drying, Principles, Selection & Design, Certified Process Plant Operations, Control & Troubleshooting, Operator Responsibilities, Storage Tanks Operations & Measurements, Process Plant Troubleshooting & Engineering Problem Solving, Process Plant Performance, Efficiency & Optimization, Continuous Improvement & Benchmarking, Process Troubleshooting Techniques, Oil & Gas Operation/Introduction to Surface Facilities, Pressure Vessel Operation, Process Equipment Performance & Troubleshooting, Plant Startup & Shutdown, Startup & Shutdown the Plant While Handling Abnormal Conditions, Flare & Relief System, Process Gas Plant Start-up, Commissioning & Problem Solving, Process Liquid and Process Handling & Measuring Equipment. Further, he is also well-versed in Compressors & Turbines Operation, Maintenance & Troubleshooting, Heat Exchanger Overhaul & Testing Techniques, Balancing of Rotating Machinery (BRM), Pipe Stress Analysis, Valves & Actuators Technology, Inspect & Maintain Safeguarding Vent & Relief System, Certified Inspectors for Vehicle & Equipment, Optimizing Equipment Maintenance & Replacement Decisions, Certified Maintenance Planner (CMP), Certified Planning and Scheduling Professional (AACE-PSP), Tank Design, Construction, Inspection & Maintenance, Material Cataloguing, Specifications, Handling & Storage, Steam Trap Design, Operation, Maintenance & Troubleshooting, Steam Trapping & Control, Column, Pump & Exchangers, Troubleshooting & Design, Rotating Equipment Operation & Troubleshooting, Control & ESD System, Detailed Engineering Drawings, Codes & Standards, Budget Preparation, Allocation & Cost Control, Root Cause Analysis (RCA), Production Optimization, Permit to Work (PTW), Project Engineering, Data Analysis, Process Hazard Analysis (PHA), HAZOP Study, Sampling & Analysis, Training Analysis, Job Analysis Techniques, Storage & Handling of Toxic Chemicals & Hazardous Materials, Hazardous Material Classification & Storage/Disposal, Dangerous Goods, Risk Monitoring Authorized Gas Tester (AGT), Confined Space Entry (CSE), Personal Protective Equipment (PPE), Fire & Gas, First Aid and Occupational Health & Safety.**

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.

### 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, 15<sup>th</sup> of December 2024**

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	<b>PRE-TEST</b>
0830 – 0900	<b>Introduction to Cooling Towers: Types, Applications &amp; Significance in Industrial Cooling Systems</b>
0900 – 0930	<b>Basic Principles of Cooling Tower Operation: Heat Transfer, Evaporation &amp; Cooling Cycles</b>
0930 – 0945	Break
0945 – 1100	<b>Components of Cooling Towers: Overview of Structure, Fill Material, Drift Eliminators, Fans &amp; Distribution Systems</b>
1100 – 1200	<b>Cooling Tower Performance &amp; Efficiency Metrics: Approaches to Measure Cooling Efficiency, Range &amp; Approach Temperatures</b>
1200 – 1215	Break
1215 – 1330	<b>Operating Conditions Variables: Influence of Ambient Conditions, Load Variations &amp; Water Properties</b>
1330 – 1420	<b>Environmental Considerations &amp; Compliance: Regulatory Standards, Environmental Impact &amp; Sustainability Practices</b>
1420 – 1430	<b>Recap</b>
1430	Lunch & End of Day One

#### **Day 2: Monday, 16<sup>th</sup> of December 2024**

0730 – 0830	<b>Water Quality Fundamentals: Importance of Water Quality in Cooling Tower Operations</b>
0830 – 0930	<b>Chemical Treatment Programs: Scaling, Corrosion &amp; Biological Growth Prevention</b>
0930 – 0945	Break
0945 – 1100	<b>Water Treatment Equipment &amp; Technology: Side-Stream Filtration, Softeners &amp; Chemical Dosing Systems</b>
1100 – 1200	<b>Conductivity &amp; pH Control: Monitoring, Adjustments &amp; their Effects on Cooling Tower Performance</b>
1200 – 1215	Break
1215 – 1330	<b>Legionella Risk &amp; Control: Guidelines for Prevention &amp; Control of Legionella in Cooling Towers</b>

1330 - 1420	<b>Case Studies: Analysis of Real-World Water Treatment Scenarios &amp; Solutions</b>
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day Two

**Day 3: Tuesday, 17<sup>th</sup> of December 2024**

0730 - 0830	<b>Routine Maintenance Practices: Daily, Weekly &amp; Monthly Maintenance Tasks</b>
0830 - 0930	<b>Inspection &amp; Monitoring Techniques: Visual Inspections, Vibration Analysis, &amp; Thermal Imaging</b>
0930 - 0945	Break
0945 - 1100	<b>Maintenance of Cooling Tower Components: Care for Fans, Motors, Fill Media, &amp; Nozzles</b>
1100 - 1200	<b>Predictive versus Preventive Maintenance: Benefits &amp; Implementation Strategies</b>
1200 - 1215	Break
1215 - 1330	<b>Record Keeping &amp; Documentation: Importance for Compliance &amp; Operational Efficiency</b>
1330 - 1420	<b>Safety Practices in Maintenance: Ensuring Worker Safety &amp; Compliance with OSHA Standards</b>
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day Three

**Day 4: Wednesday, 18<sup>th</sup> of December 2024**

0730 - 0830	<b>Common Cooling Tower Problems: Identification, Causes &amp; Solutions</b>
0830 - 1930	<b>Troubleshooting Water Quality Issues: Addressing Scaling, Fouling &amp; Biological Growth</b>
0930 - 0945	Break
0945 - 1100	<b>Mechanical &amp; Structural Troubleshooting: Diagnosing &amp; Fixing Issues with Fans, Motors, And Structural Integrity</b>
1100 - 1200	<b>Emergency Response &amp; Disaster Recovery: Preparing for &amp; Responding to Catastrophic Failures</b>
1200 - 1215	Break
1215 - 1330	<b>Upgrades &amp; Retrofitting: When &amp; How to Consider Upgrading Cooling Tower Components</b>
1330 - 1420	<b>Interactive Workshop: Participants Engage in a Hands-On Troubleshooting Simulation</b>
1420 - 1430	<b>Recap</b>
1430	Lunch & End of Day Four

**Day 5: Thursday, 19<sup>th</sup> of December 2024**

0730 - 0830	<b>Energy Efficiency &amp; Optimization: Techniques to Reduce Energy Consumption &amp; Improve Efficiency</b>
0830 - 0930	<b>Advanced Water Treatment Technologies: Innovations in Non-Chemical Treatment Options &amp; their Applications</b>
0930 - 0945	Break
0945 - 1200	<b>Case Study Analysis: Complex Problems &amp; the Applied Advanced Solutions</b>
1200 - 1215	Break
1215 - 1345	<b>Future Trends in Cooling Tower Technology: Emerging Technologies &amp; Their Potential Impact</b>
1345 - 1400	<b>Course Conclusion</b>
1400 - 1415	<b>POST-TEST</b>
1415 - 1430	Presentation of Course Certificates
1430	Lunch & End of Course

**Practical Sessions**

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



**Course Coordinator**

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