

## COURSE OVERVIEW ME0738 Caterpillar & Cummins Engine Maintenance & Troubleshooting

### Course Title

Caterpillar & Cummins Engine Maintenance & Troubleshooting

### Course Date/Venue

June 16-20, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference ME0738

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

#### Course Description









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 workshops.

This course is designed to provide participants with a detailed and up-to-date overview of Caterpillar and Cummins Engine Maintenance and Troubleshooting. It covers the key differences and similarities between Caterpillar and Cummins the major components of engine engines; covering engine block, pistons, crankshaft. camshaft, etc and the function of each; the basic principles of engine operation, lubrication systems and cooling systems; the safety protocols for working with engines; and the personal protective equipment (PPE) and risk assessment.

Further, the course will also discuss the preventive maintenance. routine engine inspections and procedures for changing and disposal of engine oil and filters; maintaining fuel filters, injectors and pumps; ensuring clean and efficient fuel supply; the air intake and exhaust systems: implementing cooling system maintenance, electrical system maintenance and turbocharger maintenance; the valve adjustment and timing using diagnostic tools for engine monitoring; and interpreting data from engine control modules (ECMS).



ME0738 - Page 1 of 8

ME0738-06-25|Rev.01|08 May 2025





During this interactive course, participants will learn the systematic troubleshooting approach; the symptoms and causes of common engine issues; troubleshooting fuel system issues and electrical system faults; diagnosing mechanical issues like noise, vibration and overheating; the engine overhaul and comprehensive maintenance program; and the emerging technologies and techniques in engine maintenance.

#### **Course Objectives**

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

- Apply and gain an in-depth knowledge on Caterpillar and Cummins engine maintenance and troubleshooting
- Discuss the key differences and similarities between Caterpillar and Cummins engines
- Identify the major components of engine covering engine block, pistons, • crankshaft, camshaft, etc and the function of each
- Recognize the basic principles of engine operation, lubrication systems and • cooling systems
- Apply safety protocols for working with engines including personal protective • equipment (PPE) and risk assessment
- Employ preventive maintenance, routine engine inspections and procedures for • changing and disposal of engine oil and filters
- Maintain fuel filters, injectors and pumps and ensure clean and efficient fuel • supply
- Recognize air intake and exhaust systems and implement cooling system maintenance, electrical system maintenance and turbocharger maintenance
- Carryout valve adjustment and timing, use diagnostic tools for engine monitoring • and interpret data from engine control modules (ECMS)
- Illustrate systematic troubleshooting approach and identify symptoms and causes • of common engine issues
- Troubleshoot fuel system issues and electrical system faults as well as diagnose • mechanical issues like noise, vibration and overheating
- Apply engine overhaul and develop a comprehensive maintenance program
- Discuss the emerging technologies and techniques in engine maintenance •

## Exclusive Smart Training Kit - H-STK<sup>®</sup>



Participants of this course will receive the exclusive "Haward Smart Training Kit" (H-STK<sup>®</sup>). The H-STK<sup>®</sup> consists of a comprehensive set of technical content which includes electronic version of the course materials conveniently saved in a **Tablet PC**.



ME0738 - Page 2 of 8





#### Who Should Attend

This course provides an overview of all significant aspects and considerations of caterpillar and cummins engine maintenance and troubleshooting for those involved in the maintenance and troubleshooting of engines including engineers, 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**

Haward's Certificates are accredited by the following international accreditation organizations:

BA

#### 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.

#### <u>The International Accreditors for Continuing Education and Training</u> (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.



ME0738 - Page 3 of 8

ME0738-06-25|Rev.01|08 May 2025





### 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:



Dr. Tony Dimitry, PhD, MSc, BSc, is a Senior Mechanical Engineer with over 30 years of industrial experience. His expertise covers Caterpillar Engine, Caterpillar Diesel Generator Maintenance, Pressure Safety Relief Valve Repair & Recalibration, **PSV/PRV** Troubleshooting, **PRV** Testing & Repair, **Valve** Testing & Inspection, Valve Sealing, Valve Calibration, Process Equipment, Vibration Analysis, Heat Exchanger, Siemens Steam Turbine

Maintenance, Electromechanical Maintenance, Machinery Alignment, Lubrication Technology, Compressors, HVAC & Refrigeration Systems, Piping System, Blower & Fan, Shaft Repair, Control Valve & Actuator, Safety Relief Valves, Pipelines, Piping Vibration Analysis, Pressure Vessels, Dry Gas Seal, Process Equipment, Diesel Engine & Crane Maintenance, Maintenance Management (Preventive, Predictive, Breakdown), Reliability Management, Condition-Based Monitoring, Rotating Equipment, Tanks & Tank Farms, Pneumatic System, Static Equipment, Failure Analysis, FMEA, Corrosion, Metallurgy, Planning, Scheduling, Cost Control, Preventive and Predictive Maintenance. Currently, he is the Maintenance Manager of the PPC Incorporation wherein he is responsible for the maintenance and upgrade of all plant components, monitoring the thermal stresses and the remaining life of steam pipes, turbine casing, mills, fans and pumps. He is in-charge of the metallurgical failure analysis and the usage of fracture mechanics for determining crack propagation in impellers of turbines, assessing all alterations and developments for upgrading the plant.

During his career life, Dr. Dimitry was a Senior Engineer in Chloride Silent (UK) wherein he was responsible for the mechanical, thermal and electrical modelling of battery problems for electric vehicles and satellites as well as an **Operations Engineer** of the National Nuclear Corporation (UK) wherein he was responsible for the optimization of the plant. Prior to this, he was a **Professor** at the **Technical University** of Crete and an Assistant Professor of the University of Manchester (UK).

Dr. Dimitry has PhD, Master and Bachelor degrees in Mechanical Engineering from the Victory University of Manchester and the University of Newcastle, UK respectively. Further, he is a Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer by the Institute of Leadership & Management (ILM) and an associate member of the American Society of Mechanical Engineers (ASME) and Institution of Mechanical Engineers (IMechE). He has further delivered various trainings, seminars, courses, workshops and conferences internationally.

### **Course Fee**

US\$ 5,500 per Delegate + VAT. This rate includes H-STK<sup>®</sup> (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.



ME0738 - Page 4 of 8





### 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% 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 workshop for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1:	Monday, 16 <sup>th</sup> June 2025
0730 – 0800	Registration & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	PRE-TEST
	<b>Overview of Caterpillar &amp; Cummins Engines</b>
0830 - 0930	History & Applications in Marine & Offshore Construction • Key Differences
	& Similarities Between Caterpillar & Cummins Engines
0930 - 0945	Break
	Engine Components & Functions
0945 - 1030	Major Components: Engine Block, Pistons, Crankshaft, Camshaft, etc. •
	Understanding the Function of Each Component
	Basic Principles of Engine Operation
1030 - 1130	Internal Combustion Engine Principles • Four-Stroke & Two-Stroke Engine
	Cycles
1130 1215	Lubrication Systems
1150 - 1215	Importance of Lubrication • Types of Lubricants & their Applications
1215 – 1230	Break
	Cooling Systems
1230 - 1330	Types of Cooling Systems (Air-Cooled, Water-Cooled) • Maintenance of
	Cooling Systems
	Safety Practices
1330 - 1420	Safety Protocols for Working with Engines • Personal Protective Equipment
	(PPE) & Risk Assessment
	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
	Discussed Tomorrow
1430	Lunch & End of Day One



ME0738 - Page 5 of 8





Day 2:	Tuesday, 17 <sup>th</sup> June 2025
0730 - 0830	<b>Preventive Maintenance</b> Importance of Preventive Maintenance • Developing a Preventive Maintenance Schedule
0830 - 0930	Routine Engine InspectionsChecklist for Daily, Weekly & Monthly InspectionsIssues During Inspections
0930 - 0945	Break
0945 - 1100	<i>Oil &amp; Filter Changes</i> <i>Procedures for Changing Engine Oil &amp; Filters</i> • <i>Best Practices for Disposing of</i> <i>Used Oil &amp; Filters</i>
1100 - 1215	<b>Fuel System Maintenance</b> Maintenance of Fuel Filters, Injectors & Pumps • Ensuring Clean & Efficient Fuel Supply
1215 - 1230	Break
1230 - 1330	<i>Air Intake &amp; Exhaust Systems</i> <i>Maintenance of Air Filters &amp; Exhaust Systems</i> • <i>Importance of Clean Air</i> <i>Intake for Engine Performance</i>
1330 - 1420	Practical Exercise: Routine Maintenance TasksHands-on Session Performing Routine Maintenance on Caterpillar & CumminsEngines • Group Discussion on Maintenance Challenges
1420 – 1430	<b>Recap</b> 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
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Day 3:	wednesday, 18 <sup>th</sup> June 2025
	Cooling System Maintenance
0730 - 0830	Flushing & Refilling Coolant • Inspecting & Replacing Coolant Hoses &
	Radiators
	Electrical System Maintenance
0830 - 0930	Checking Battery Health & Connections • Maintenance of Alternators &
	Starter Motors
0930 - 0945	Break
	Turbocharger Maintenance
0945 – 1100	Inspecting & Cleaning Turbochargers • Understanding the Impact of
	Turbocharger Performance on Engine Efficiency
	Valve Adjustment & Timing
1100 – 1215	Importance of Proper Valve Adjustment • Procedures for Checking &
	Adjusting Valve Timing
1215 – 1230	Break
	Diagnostics & Monitoring Tools
1230 – 1330	Using Diagnostic Tools & Software for Engine Monitoring • Interpreting Data
	from Engine Control Modules (ECMs)
	Practical Exercise: Advanced Maintenance Tasks
1330 – 1420	Hands-on Session Performing Advanced Maintenance on Engines • Group
	Discussion on Advanced Maintenance Techniques
	Recap
1420 1430	Using this Course Overview, the Instructor(s) will Brief Participants about the
1420 - 1430	Topics that were Discussed Today and Advise Them of the Topics to be
	Discussed Tomorrow
1430	Lunch & End of Day Three







Day 4:	Thursday, 19 <sup>th</sup> June 2025
0730 - 0830	Systematic Troubleshooting Approach
	Steps for Effective Troubleshooting • Importance of a Methodical Approach
	Common Engine Problems & Solutions
0830 - 0930	Identifying Symptoms & Causes of Common Engine Issues • Practical
	Solutions for Common Problems
0930 - 0945	Break
	Fuel System Troubleshooting
0945 - 1100	Diagnosing & Resolving Fuel System Issues • Practical Exercises in Fuel
	System Troubleshooting
	Electrical System Troubleshooting
1100 – 1215	Identifying & Resolving Electrical System Faults • Practical Exercises in
	Electrical Troubleshooting
1215 – 1230	Break
	Mechanical Troubleshooting
1230 – 1330	Diagnosing Mechanical Issues Such as Noise, Vibration & Overheating •
	Practical Exercises in Mechanical Troubleshooting
1330 - 1420	Group Project: Troubleshooting Scenario
	Collaborative Project on Diagnosing & Resolving an Engine Issue •
	Presentation & Discussion of Findings
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, 20 <sup>th</sup> June 2025
	Comprehensive Engine Overhaul
0730 - 0930	Steps Involved in a Complete Engine Overhaul • Best Practices for Engine
	Disassembly & Reassembly
0930 - 0945	Break
	Case Studies: Real-World Troubleshooting
0945 – 1100	Analysis of Real-World Engine Failures & Solutions • Lessons Learned & Best
	Practices
	Implementing a Maintenance Program
1100 – 1230	Developing & Implementing a Comprehensive Maintenance Program •
	Ensuring Consistency & Quality in Maintenance Practices
1230 - 1245	Break
	Future Trends in Engine Maintenance
1245 – 1345	Emerging Technologies & Techniques in Engine Maintenance • Impact on
	Marine & Offshore Construction
	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



ME0738 - Page 7 of 8





## **Practical Sessions**

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



# **Course Coordinator**

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org



ME0738 - Page 8 of 8

