COURSE OVERVIEW ME1117
CFR Octane Cylinder & Crankcase Overhaul

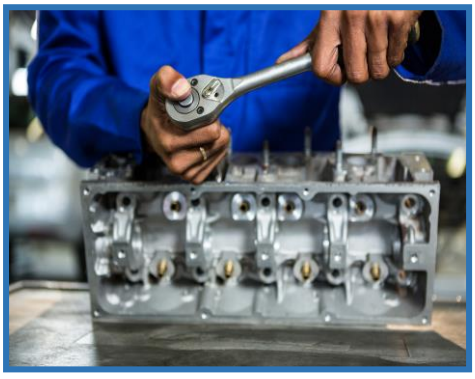
Course Title
CFR Octane Cylinder & Crankcase Overhaul

Course Date/Venue
September 14-18, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Course Reference
ME1117

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 CFR Octane Cylinder and Crankcase Overhaul. It covers the purpose of CFR engines, ASTM D2699 and D2700 testing standards; the function of the octane cylinder and crankcase; the main components of cylinder head, crankcase and valve train and special features of CFR engines; the octane cylinder construction and function, crankcase assembly and operation; the tools, manuals, and safety procedures, preparation of cylinder disassembly and cylinder head and valve removal; the piston, ring and sleeve disassembly and cylinder inspection procedures; the sensor integrity and wiring checks, and inspecting detonation pickup hole; and the gasket and sealing surfaces and calibration considerations after reassembly.

Further, the course will also discuss the crankcase disassembly preparation, crankshaft and bearing removal and connecting rod and cam mechanism removal; the inspection of crankcase components and troubleshooting common crankcase issues; cleaning and degreasing components, honing cylinder sleeve, installing new piston rings and gaskets and ensuring correct piston orientation; reinstalling sleeve and piston, valve lapping and seat adjustment; and reinstalling valve train components and torque procedures for cylinder head bolts.

During this interactive course, participants will learn the installation of crankshaft and bearings, aligning and torquing main caps, reconnecting rods and piston alignment; the lubrication path verification, alignment and clearance verification including torque, lubrication and final checks; and the preventive maintenance best practices and troubleshooting after reassembly by identifying startup issues, unusual vibration/noise causes, detonation reading errors and root cause analysis and rectification.

Course Objectives

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

- Apply and gain an in-depth knowledge on CFR (cooperative fuel research) octane cylinder and crankcase overhaul
- Discuss the purpose of CFR engines, ASTM D2699 and D2700 testing standards and function of the octane cylinder and crankcase
- Identify the main components of cylinder head, crankcase and valve train and special features of CFR engines
- Recognize octane cylinder construction and function, crankcase assembly and operation as well as tools, manuals and safety procedures
- Prepare cylinder disassembly and apply cylinder head and valve removal
- Carryout piston, ring and sleeve disassembly and cylinder inspection procedures
- Discuss sensor integrity and wiring checks, inspect detonation pickup hole and apply gasket and sealing surfaces and calibration considerations after reassembly
- Illustrate crankcase disassembly preparation, crankshaft and bearing removal and connecting rod and cam mechanism removal
- Inspect crankcase components and troubleshoot common crankcase issues
- Clean and degrease components, hone cylinder sleeve, install new piston rings and gaskets and ensure correct piston orientation
- Reinstall sleeve and piston and apply valve lapping and seat adjustment, reinstalling valve train components and torque procedures for cylinder head bolts
- Install crankshaft and bearings, align and torque main caps, reconnect rods and piston alignment and apply lubrication path verification
- Carryout alignment and clearance verification including torque, lubrication and final checks
- Employ initial testing and engine startup, calibration for octane testing, operational checks and fine-tuning
- Apply preventive maintenance best practices and troubleshoot after reassembly by identifying startup issues, unusual vibration/noise causes, detonation reading errors and root cause analysis and rectification

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 CFR octane cylinder and crankcase overhaul for mechanical technicians and engineers, engine rebuild and overhaul technicians, maintenance supervisors and managers, fuel quality control technicians, refinery and fuel testing professionals, automotive and engine performance engineers, inspectors, energy and transportation officials and those who involved in the maintenance, calibration, and operation of cooperative fuel research (CFR) engines, particularly in fuel testing and engine performance evaluation.

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. Manuel Dalas, MSc, BSc, is a **Senior Mechanical & Maintenance Engineer** with over **25 years** of industrial experience in **Oil**, **Gas**, **Refinery**, **Petrochemical**, **Power** and **Nuclear** industries. His wide expertise includes **Root Cause Failure Analysis**, Rotating Equipment Maintenance & **Failure Analysis**, **Failure Analysis Methodologies** for Mechanical Engineers, **Reliability Centered Maintenance & Root Cause Failure Analysis**, **Machinery Failure Analysis**, Prevention & Troubleshooting, **Machinery** Failure Analysis, Machinery Root Cause Failure Analysis **(RCFA)**, **Machinery Diagnostics & Root Cause Failure** Analysis, **Water Well**, **Transfer & Network Systems** Operation, **Water Network Systems & Pumping** Stations, **Instrument**, **Control & Protection** Systems, Plumbing **Network Systems** & Building, **Water Distribution & Pump** Station, **Boiler** Operation & Water Treatment, **Pipeline** Simulations, **Pipe Stress Analysis** using **CAESAR II**, **CAESAR II** Application, **Piping Dynamic**, **Static & Other Special Analysis** using **CAESAR II**, **Expansion Joints** Design & Analysis, **Impact Load** Analysis, **Piping** Systems, **Piping Codes** Used in **CAESAR II**, **RFP Pipe** Maintenance & Repair, **Relief Valve** Analysis, Safety **Relief Valve**, **Tanks & Tank Farms**, **Atmospheric Tanks**, **Seismic Loads**, **Tank Shell**, **Tank Failure**, **Vacuum Tanks**, **Tank Design & Engineering**, **Tank Contractions**, **Material Cataloguing**, **Maintenance Planning & Scheduling**, Reliability Centered Maintenance (**RCM**), **Reliability Maintenance**, **Condition Based Maintenance & Condition Monitoring**, **Asset & Risk** Management, **Vibration Condition Monitoring & Diagnostics** of Machines, **Vibration & Predictive** Maintenance, Reliability Improvement & Vibration Analysis for Rotating Machinery, Effective Maintenance **Shutdown & Turnaround** Management, **Engineering Codes & Standards**, **Rotating Equipment** Maintenance, **Mechanical** Troubleshooting, **Static Mechanical Equipment** Maintenance, **Plant Reliability & Maintenance** Strategies, **Centrifugal Pumps** Maintenance & Troubleshooting, **Fans**, **Blowers & Compressors**, **Process Control Valves**, Piping Systems & Process Equipment, **Gas Turbines & Compressors** Troubleshooting, Advanced **Valve** Technology, **Pressure Vessel** Design & Analysis, **Steam & Gas Turbine**, **High Pressure Boiler** Operation, **FRP Pipe** Maintenance & Repair, **Centrifugal & Positive Displacement Pump** Technology Troubleshooting & Maintenance, **Rotating Machinery** Best Practices, **Diesel Engine** Operations, Maintenance & Troubleshooting, **PD Compressor & Gas Engine** Operation & Troubleshooting, **Hydraulic Tools & Fitting**, **Mass & Material BalanceTank Farm & Tank Termina**l Safety & Integrity Management, **Process Piping** Design, Construction & **Mechanical Integrity**, **Stack & Noise** Monitoring, **HVAC & Refrigeration** Systems, BPV Code, Section VIII, Division 2, **Facility Planning & Energy** Management, Hoist - Remote & Basic **Rigging & Slinging**, **Mobile Equipment** Operation & Inspection, **Heat Exchanger**, **Safety Relief Valve**, **PRV & POPRV/PORV**, **Bearing & Lubrication**, **Voith Coupling** Overhaul, **Pump & Valve** Technology, **Lubrication** Inspection, **Process Plant** Optimization, Rehabilitation, Revamping & Debottlenecking, Engineering Problem Solving and **Process Plant** Performance & Efficiency. Currently, he is the **Technical Consultant** of the **Association of Local Authorities of Greater Thessaloniki** where he is in charge of the mechanical engineering services for piping, pressure vessels fabrications and ironwork.

During his career life, Mr. Dalas has gained his practical and field experience through his various significant positions and dedication as the **Technical Manager**, **Project Engineer**, **Safety Engineer**, **Deputy Officer**, **Instructor**, **Construction Manager**, **Construction Engineer**, **Consultant Engineer**, **Water Network Systems Engineer**, **Maintenance Engineer** and **Mechanical Engineer** and **CAESAR II Application Consultant** for numerous multi-billion companies including the **Biological Recycling Unit** and the **Department of Supplies** of **Greece**, **Alpha Bank Group**, **EMKE S.A**, **ASTE LLC** and **Polytechnic College of Evosmos**.

Mr. Dalas has a **Master's** degree in **Energy System** from the **International Hellenic University, School of Science & Technology** and a **Bachelor's** degree in **Mechanical Engineering** from the **Mechanical Engineering Technical University of Greece** along with a **Diploma** in **Management & Production Engineering** from the **Technical University of Crete**. Further, he is a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), a **Certified Project Manager Professional** (**PMI-PMP**), a **Certified Instructor/Trainer**, a **Certified Energy Auditor** for **Buildings**, **Heating & Climate Systems**, a **Member** of the **Hellenic Valuation Institute** and the **Association of Greek Valuers** and a **Licensed Expert Valuer Consultant** of the **Ministry of Development and Competitiveness**. He has further delivered numerous trainings, courses, seminars, conferences and workshops 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.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

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: Sunday, 14th of September 2025

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to CFR Engine & Octane Rating*** *History and Purpose of CFR Engines • ASTM D2699 (RON) and D2700 (MON) Testing Standards • Function of the Octane Cylinder and Crankcase • Industry Applications and Importance*
0930 – 0945	*Break*
0945 – 1030	***Engine Configuration & Component Overview*** *Main Components: Cylinder Head, Crankcase, Valve Train • Relationship Between Cylinder and Crankcase • Combustion Chamber Design • Special Features of CFR Engines (Variable Compression, Detonation Measurement)*
1030 – 1130	***Octane Cylinder Construction & Function*** *Cylinder Housing and Sleeve • Cylinder Cooling and Lubrication • Detonation Pickup Sensor • Role in Test Reproducibility*
1130 – 1215	***Crankcase Assembly & Operation*** *Crankshaft and Connecting Rod Assembly • Bearings, Counterweights, and Balance • Lubrication Pathways and Oil Control • Integration with Flywheel and Motor*
1215 – 1230	*Break*

1230 – 1330	***Tools, Manuals & Safety Procedures*** *Required Tools and Measuring Instruments • Interpreting OEM Service Manuals • PPE and Safety Hazards • Lockout/Tagout and Workspace Organization*
1330 – 1420	***Workshop: Engine Familiarization*** *Visual Walkthrough of a CFR Engine • Identify Cylinder and Crankcase Components • Safety Inspection of Tools and Workspace • Q&A and Group Discussion*
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: Monday, 15th of September 2025

0730 – 0830	***Preparation for Cylinder Disassembly*** *Engine Shutdown and Power Isolation • Draining Fluids (Coolant, Oil) • Removing Auxiliary Systems (Sensors, Cooling Lines) • Documentation of Pre-Disassembly Condition*
0830 – 0930	***Cylinder Head & Valve Removal*** *Removing Cylinder Head Bolts and Cover • Extracting Intake and Exhaust Valves • Valve Spring Compressor Usage • Handling and Labeling of Parts*
0930 – 0945	*Break*
0945 – 1100	***Piston, Ring & Sleeve Disassembly*** *Removing the Piston and Wrist Pin • Pulling the Cylinder Sleeve • Removing Compression and Oil Rings • Checking for Scoring or Wear*
1100 – 1215	***Cylinder Inspection Procedures*** *Measuring Bore Diameter and Taper • Inspecting Sleeve Condition • Valve and Seat Wear Inspection • Piston Crown Damage and Skirt Clearance*
1215 – 1230	*Break*
1230 – 1330	***Detonation Sensor & Cylinder Cap Check*** *Sensor Integrity and Wiring Checks • Inspection of Detonation Pickup Hole • Gasket and Sealing Surfaces • Calibration Considerations After Reassembly*
1330 – 1420	***Workshop: Cylinder Strip-Down Practice*** *Hands-On Disassembly of Test Cylinder • Labeling and Storing Parts Correctly • Visual Damage Assessment • Team Debrief*
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, 16th of September 2025

0730 – 0830	***Crankcase Disassembly Preparation*** *Supporting Engine Block Properly • Draining Crankcase Oil • Identifying Key Access Points • Risk Assessment for Heavy Components*
0830 – 0930	***Crankshaft & Bearing Removal*** *Unbolting Bearing Caps • Extracting Crankshaft Safely • Removal of Thrust Bearings • Storage and Handling Precautions*
0930 – 0945	*Break*

0945 – 1100	***Connecting Rod & Cam Mechanism Removal*** *Disconnecting Connecting Rod from Piston • Checking Rod Alignment and Bearing Condition • Extracting Cam and Associated Gears • Crankcase Housing Inspection*
1100 – 1215	***Inspection of Crankcase Components*** *Visual Inspection for Scoring or Cracks • Micrometer Measurements: Journals and Bearings • Oil Gallery Cleaning and Pressure Check • Flatness of Mating Surfaces*
1215 – 1230	*Break*
1230 – 1330	***Troubleshooting Common Crankcase Issues*** *Bearing Noise or Knock • Oil Leakage or Low Pressure • Vibration and Misalignment Symptoms • Excessive Wear Diagnosis*
1330 – 1420	***Workshop: Crankcase Overhaul Demonstration*** *Guided Disassembly of Crankcase Unit • Bearing Clearance Measurements • Crankshaft Run-Out Test • Documentation of Faults*
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: Wednesday, 17th of September 2025

0730 – 0830	***Cylinder Component Cleaning & Preparation*** *Cleaning and Degreasing Components • Honing Cylinder Sleeve • Installing New Piston Rings and Gaskets • Ensuring Correct Piston Orientation*
0830 – 0930	***Reassembly of Octane Cylinder*** *Reinstalling Sleeve and Piston • Valve Lapping and Seat Adjustment • Reinstalling Valve Train Components • Torque Procedures for Cylinder Head Bolts*
0930 – 0945	*Break*
0945 – 1100	***Crankcase Reassembly*** *Installing Crankshaft and Bearings • Aligning and Torquing Main Caps • Reconnecting Rods and Piston Alignment • Lubrication Path Verification*
1100 – 1215	***Alignment & Clearance Verification*** *Checking Crankshaft Endplay • Valve Clearance (Lash) Settings • Piston-to-Valve Clearance • Detonation Sensor Gap Check*
1215 – 1230	*Break*
1230 – 1330	***Torque, Lubrication & Final Checks*** *Applying Correct Torque Sequences • Priming Oil System • Sealing Interfaces Properly • Rotational Test and Crankshaft Movement Check*
1330 – 1420	***Workshop: Group Reassembly Exercise*** *Guided Reassembly in Small Teams • Sequential Documentation • Live Demonstration of Sensor Connection • Instructor Validation and Q&A*
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: Thursday, 18th of September 2025

0730 – 0830	***Initial Testing & Engine Startup*** *First Rotation and Manual Crank Test • Electrical Reconnection and Startup Procedure • Idle Running Checks and Abnormal Sound Detection • Monitoring Oil Pressure and Cooling*
0830 – 0930	***Calibration for Octane Testing*** *Detonation Meter Setup • Spark Timing and Compression Ratio Adjustments • Knock Detection Verification • Ensuring ASTM Compliance*
0930 – 0945	*Break*
0945 – 1100	***Operational Checks & Fine-Tuning*** *Stable Combustion and Load Testing • Oil and Coolant Leak Inspection • Thermal Stability and Vibration Analysis • Electrical Sensor Functionality*
1100 – 1215	***Preventive Maintenance Best Practices*** *Recommended Service Intervals • Daily/Weekly/Monthly Checklists • Recording Measurements and Observations • Wear Pattern Monitoring*
1215 – 1230	*Break*
1230 – 1300	***Troubleshooting After Reassembly*** *Identifying Startup Issues • Unusual Vibration/Noise Causes • Detonation Reading Errors • Root Cause Analysis and Rectification*
1300 – 1345	***Capstone Practical & Course Review*** *Final Practical Assessment of Overhaul Skills • Recap of Disassembly/Reassembly Steps • Interactive Troubleshooting Quiz • Participant Feedback and Certification*
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*

Practical Sessions

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

Course Coordinator

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