# COURSE OVERVIEW RE0058
# Certified Machinery Lubrication Engineer (MLE)
*ICML Certification*

**Course Title**
Certified Machinery Lubrication Engineer (MLE): *ICML Certification*


**Course Date/Venue**
October 13-17, 2024/ Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

**Course Reference**
RE0058

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

**Online Exam Window**
As per ICML Schedule

**Course Description**

***This practical and highly-interactive course includes real-life case studies and exercises 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 Certified Machinery Lubrication Engineer (MLE): ISO 18436-4/ICML Certification. It covers the basic elements of asset management, ISO 55000 and ICML 55; the machine reliability, machine maintenance and condition-based maintenance; the fundamentals of tribology, friction, wear and lubrication; and the lubricant formulation for machine types to achieve optimum reliability, engineering consumption, safety and environmental protection.

Further, the course will also discuss the job-and-task-based skills including the training related to lubrication and reliability by user organizations; the lubrication support facilities needed in plants and work sites; the risk management for lubricated machines; the optimum machine modifications and features needed to achieve and sustain reliability goals; and the lubricant selection for optimum reliability, safety, energy consumption and environmental protection based on machine type and application.

During this interactive course, participants will learn the lubrication-related planning, scheduling and work processing; the periodic lubrication maintenance tasks and inspection of lubricated machines for optimum reliability, safety, environmental protection and condition monitoring; the lubricant analysis and condition monitoring for optimum reliability objectives including fault/failure troubleshooting, root cause analysis (RCA) and remediation; the supplier compliance/alignment and procurement of services and products; the waste and used lubricant management and environmental compliance; the energy conservation, environmental protection, health and safety, oil reclamation, decontamination, de-varnishing and additive reconstruction; the lubrication during standby, storage and commissioning; and the program metrics and continuous improvement.

## Course Objectives

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

- Get certified as a *"Machinery Lubrication Engineer (MLE)"* from the International Council for Machinery Lubrication (ICML) in accordance with the ISO 18436-4 standards
- Discuss the basic elements of asset management, ISO 55000 and ICML 55
- Carryout machine reliability, machine maintenance and condition-based maintenance
- Explain the fundamentals of tribology, friction, wear and lubrication
- Recognize the lubricant formulation for machine types to achieve optimum reliability, engineering consumption, safety and environmental protection
- Identify job-and-task-based skills including the training related to lubrication and reliability by user organizations
- Discuss the lubrication support facilities needed in plants and work sites
- Apply risk management for lubricated machines as well as the optimum machine modifications and features needed to achieve and sustain reliability goals
- Carryout lubricant selection for optimum reliability, safety, energy consumption and environmental protection based on machine type and application
- Employ lubrication-related planning, scheduling and work processing
- Develop periodic lubrication maintenance tasks and inspect lubricated machines for optimum reliability, safety, environmental protection and condition monitoring
- Apply lubricant analysis and condition monitoring for optimum reliability objectives including fault/failure troubleshooting, root cause analysis (RCA) and remediation
- Illustrate supplier compliance/alignment and procurement of services and products as well as waste and used lubricant management and environmental compliance
- Implement energy conservation, environmental protection, health and safety, oil reclamation, decontamination, de-varnishing and additive reconstruction
- Carryout lubrication during standby, storage and commissioning and discuss program metrics and continuous improvement

## 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, sample video clips of the instructor's actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.*

## Who Should Attend

This course provides a wide understanding and deeper appreciation of machine lubrication engineering for maintenance and reliability professionals who are seeking ICML certification. Further, maintenance engineers, reliability engineers, lubricant analysts, lubrication technicians, craftsmen and millwrights, equipment operators, maintenance supervisors, predictive maintenance technicians, lubricant industry professionals and laboratory analysts will also benefit from this course.

## Exam Eligibility & Structure

Exam candidates shall have the following minimum pre-requisites:

- **Education and/or Experience** - Candidates must have at least 5 years' education (post-secondary) or on-the-job training in one or more of the following fields: engineering, mechanical maintenance, maintenance trades, lubrication, oil analysis and/or condition monitoring (mechanical machinery).
- No engineering degree or ICML certifications are pre-requisites to candidacy for the MLE certification. However, the MLAs and MLTs would support a candidate's preparation for the MLE test.
- **Examination** – Each candidate must successfully pass a 150-question, multiple choice Machinery Lubrication Engineer (MLE) examination that tests the candidate's mastery of the ICML's Machinery Lubrication Engineer (MLE) body of knowledge. Candidates have four hours to complete the closed-book examination. A score of 70% is required to pass the examination and achieve certification.

## 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

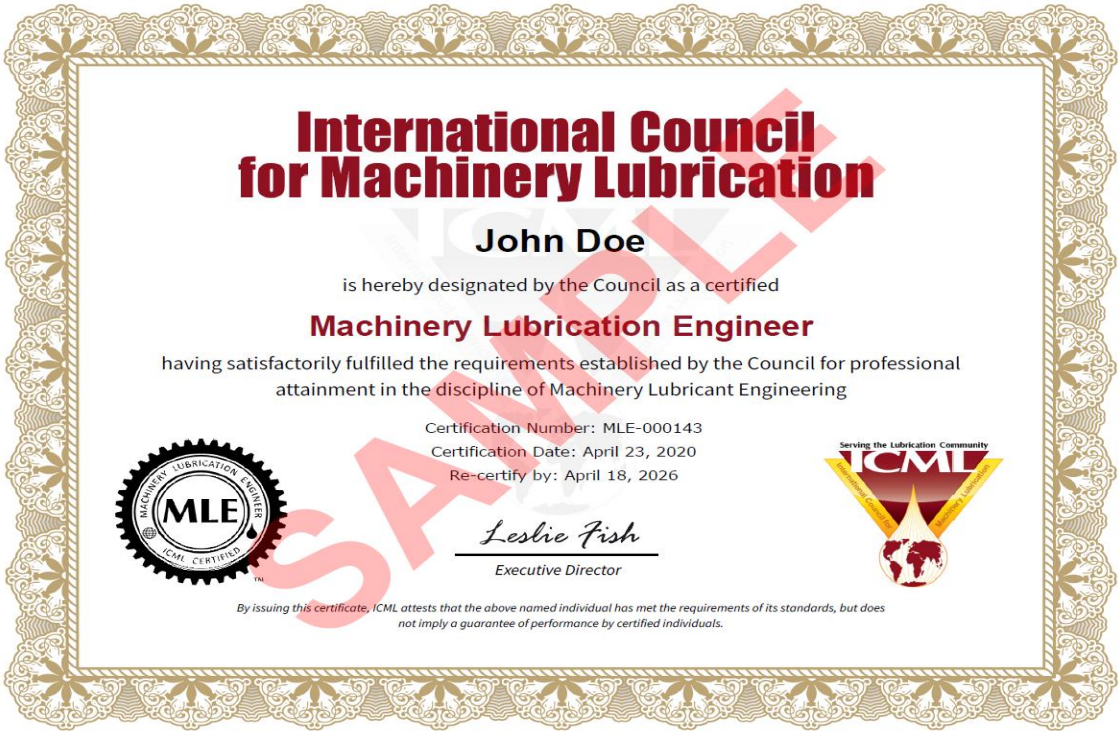
In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

## Accommodation

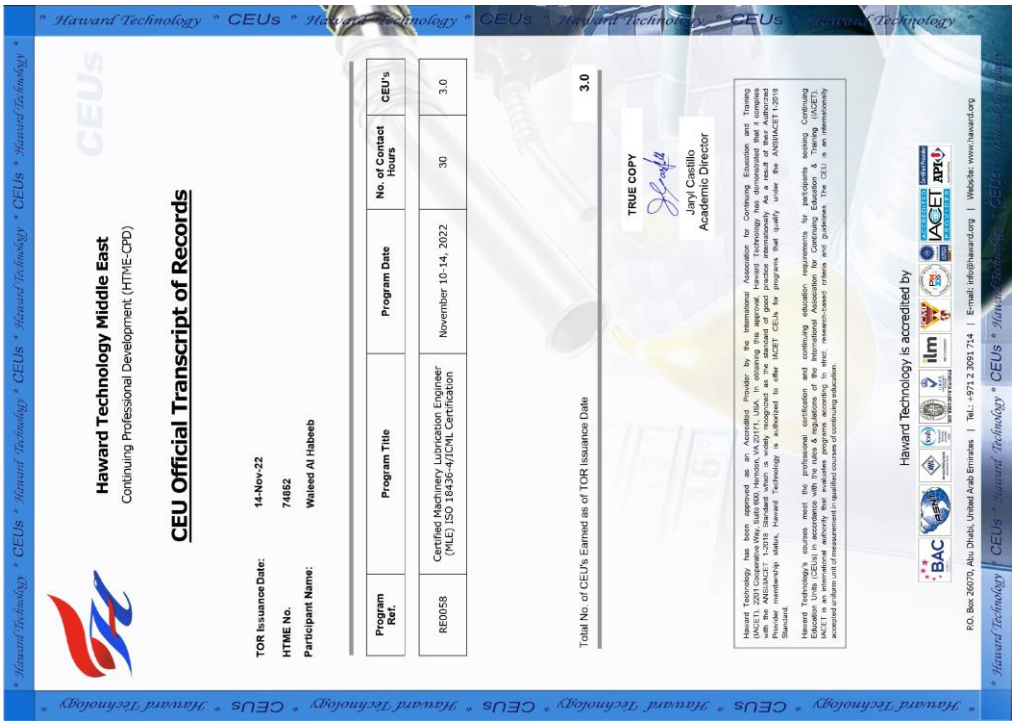
Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

## Course Certificate(s)

(1) ICML certificates will be issued to participants who have successfully completed the course and passed the exam at the end of the course. Successful candidate will be certified as a *"Machinery Lubrication Engineer (MLE)".*




(2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.



**CEU Official Transcript of Records**

Haward Technology Middle East
Continuing Professional Development (HTME-CPD)

TOR Issuance Date: 14-Nov-22
HTME No. 74852
Participant Name: Waleed Al Habeeb

| Program Ref. | Program Title | Program Date | No. of Contact Hours | CEU's |
|---|---|---|---|---|
| RE0058 | Certified Machinery Lubrication Engineer (MLE) ISO 18436-4/ICML Certification | November 10-14, 2022 | 30 | 3.0 |

Total No. of CEU's Earned as of TOR Issuance Date: 3.0

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Jaryl Castillo
Academic Director

Haward Technology is accredited by

## Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

- International Council for Machinery Lubrication (ICML)

  This Machine Lubricant Analyst Certification course complies with the **ICML** (**International Council for Machinery Lubrication**) regulation and is designed to certify successful participant as a Machine Lubricant Analyst (MLA) Level-I.

- 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.

- 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 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. Martin Williamson** (**UK**), PE, BSc, CMRP, MLA, MLT, is an **International Authority** in **Machinery Lubrication**, **ICML Certification** and **ISO 18436 Standards** with over **30 years** of practical experience. He is an **ICML Authorized Instructor & Consultant**. His wide expertise covers **Machinery Lubrication**, **ICML Certification**, **ISO 18436-4**, **ISO Standards Development**, **Condition Monitoring**, **Vibration & Oil Analysis**, **Contamination Monitoring, Tribology**, **Reliability Engineering** and **Scheduling Design**. He is currently the **Managing Director** of **KEW Engineering Ltd**. that provides reliability and maintenance best practices engineering consulting and training services to the **petrochemical**, **oil**, **gas** and allied industries in **Europe**, **Australia**, **North America**, the **Middle East**, **Asia** and **South African** regions.

For the last 10 years, Mr. Williamson has been presenting training classes and undertaking consulting projects on an international level on behalf of **Noria Corporation** and other key clients such as **BP**, **Dow Corning**, **Marathon Oil** and **Cargill**. Since he attained his **CMRP** (Certified Maintenance & Reliability Professional) status, he has been involved with **ICML** (International Council for Machinery Lubrication) as an **ICML Authorized Instructor & Consultant** and is working on various related **ISO** working groups. Prior to this, he gained his remarkable experience for being the **General Manager** in Noria UK Limited (UK), **Oil Analysis Product Manager** in Rockwell Automation Entek (UK), **Senior Technical Support Engineer** in Pall Europe Limited (UK) and **Mechanical Engineer** in ISCOR Ltd.

Mr. Williamson is a **Professional Engineer** and has a **Bachelor** degree in **Mechanical Engineering**. Further, he is a **Certified CMRP** (Maintenance & Reliability Professional) from the Society of Maintenance & Reliability Professionals (**SMRP**) and a **Certified MLT1** (Machinery Lubricant Technician) from the International Council for Machinery Lubrication (**ICML**) apart from being a **Certified MLA1**. He is also a **Certified Trainer** for **BOSIET** (Basic Off-Shore Safety Induction and Emergency Training) and **HUET** (Helicopter Underwater Evacuation Training).

## Training Fee

**US$ 7,000** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

## Exam Fee

**US$ 450** per Delegate + **VAT**.

## 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 13th of October 2024***

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| *0730 – 0800* | *Registration & Coffee* |
| *0800 - 0815* | *Welcome & Introduction* |
| *0815 – 0830* | ***PRE-TEST*** |
| *0830 – 0930* | ***Asset Management, ISO 55000 & ICML 55; Basic Elements***<br>*Definition of Asset Management in the Context of the Organization • ISO 55001 Requirements (refer also EN 16646 for Physical Assets) • Physical Asset Hierarchy (ISO 14224:2016) • ICML 55 Attributes & Requirements in the Context of Machinery Lubrication* |
| *0930 – 0945* | *Break* |
| *0945 – 1115* | ***Machine Reliability: Basic Elements***<br>*Reliability Philosophies & Strategies • Condition-Based Maintenance (See also Major Subject 4.0) • Reliability Culture • Financial Analysis & Economic Justification • Failure Modes Effects Analysis (FMEA), Failure Reporting, Failure Reporting, Analysis & Corrective Action System (FRACAS & Root Cause Analysis (RCA) (See also Major Subject 16.0) • Asset Design Change Process & Management of Change • Critically Analysis & Risk Management • Metrics, KPIs, Scorecard, Overall Equipment Effectiveness (OEE) • Asset life Cycle Engineering & Management • Design for Reliability, Operability & Maintainability • Managing Sources of Vibration & Wear Including the Fasteners, Alignment & Balance* |
| *1115 – 1215* | ***Machine Maintenance; Basic Elements***<br>*Procedure-Based Maintenance & Standardized Work • PM Optimization • Work Management, Planning & Scheduling • Shutdown, Turnaround & Outage Management* |
| *1215 – 1230* | *Break* |
| *1230 – 1300* | ***Machine Maintenance; Basic Elements (cont'd)***<br>*Operator-Driven Maintenance, Autonomous Maintenance, Total Productive Maintenance • Enterprise Asset Management (EAM) & Computerized Maintenance Management System • Stores, Parts & Inventory Management • Workforce Management, Skills & Training* |

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| *1300 – 1420* | ***Condition-Based Maintenance (CMB); Basic Elements***<br>*Condition-Based Maintenance versus Breakdown Maintenance • Predictive Maintenance • Proactive Maintenance • Inspection 2.0 • CBM Technologies (Lubricant Analysis, Vibration, Thermography, Acoustics, Motor Current, etc.) • CBM for Major Machine Categories: Pumps, Compressor, Turbines, Gearboxes • CBM Integration & Program Management • CBM Data Management* |
| *1420 – 1430* | ***Recap***<br>*Using this Course Overview, the instructor(s)will Brief Participants about the Topics that were Discussed Today and Advice Them of the Topics to be Discussed Tomorrow* |
| *1430* | *Lunch & End of Day One* |

***Day 2:*** ***Monday, 14th of October 2024***

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| *0730 – 0900* | ***Tribology, Friction, Wear & Lubrication Fundamentals; Basic Elements***<br>*Mechanical Friction, Fluid Friction, Dry Friction • Lubrication Fundamentals • Lubrication Regimes, Thick Film, Hydrodynamic, Elastohydrodynamic, Boundary • Film Thickness, Specific Film Thickness, Mixed Film • Film Strength, Additive & Chemical-Induced Films • Corrosive, Cavitation & Erosive Wear • Mechanical Wear, Abrasion, Adhesion, Surface Fatigue* |
| *0900 – 0915* | *Break* |
| *0915 – 1045* | ***Lubricant Formulation for Machine Types to Achieve Optimum Reliability, Energy Consumption, Safety & Environmental Protection; Basic Elements***<br>*Liquid & Grease Lubricants, Formulation Science, Base Oils, Common Thickeners, Common Additives • Solid Film Lubrication & Types • Physical & Chemical Properties of Lubricating Oils & Grease • Common Lubricant Laboratory Test Methods such as Oxidation Stability, Viscosity Index, Film Strength, Rust Suppression, Air Release, Demulsibility, Penetration Number, Dropping Point, Water Washout Resistance, Biodegradability, etc. • Differences & Unique Physical & Chemical Properties of Major Lubricant Formula Categories Including: Engine Oil, Automatic Transmission Fluid, Brake Fluid, Hydraulic Fluid, Turbine Oil, Gear Oil, Compressor Lubricant, Chain Lubricant, Wheel Bearing Grease, Chassis Grease, Electric Motor Bearing Grease, Coupling Grease, Multipurpose Grease, Foodgrade Lubricants* |
| *1045 – 1200* | ***Job-& Task-Based Skills/Training Related to Lubrication & Reliability by User Organizations***<br>*Skills Possibly Required for Common Tasks Performed by Lubrications Technicians • Skills Possibly Required for Common Tasks Performed by Operators & Inspectors • Skills Possibly Required for Common Tasks Performed by Mechanics & Millwrights • Training & Knowledge Required by Reliability Engineers & Maintenance Supervision • Training & Knowledge Required by Plant Management • Standardized Training, Tasked-Based Training & Competency Testing for Practitioners in the Lubrication Field, ISO 18436* |
| *1200 – 1215* | *Break* |

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| *1215 – 1315* | ***Lubrication Support Facilities Needed in Plants & Work Sites***<br>*Design & Use of a Lube Room Facility that Meets Reliability, Safely & Environment Requirements • Design & Use of Lubricant Storage Facilities Including Bulk Tank, Tank Farms, Totes, etc. that Meet Reliability, Safety, Environment & Regulatory Requirements • Standardized Lubricant Labeling for Packaged & Bulk Vessels • Proper Selection, Use & Care of Tools for Inspection & Reconditioning of Tank, Vessel & Containers Related to Cleanliness, Cross Contamination, Bottom Sediment & Water & Leakage • Spill Containment & Leak Protection Practices for Environmental Protection & Basic Regulatory Compliance • Transfer, Handling, Dispensing, Filtration from Drums, Totes & Day Tanks • Transfer, Handling, Dispensing, Filtration from Bottles, Jugs & Small Grease Packages • Selection & Use of Workplace & Lube Room Tools & Accessories (Tools, Benches, Rooms, Lockers/Cabinets, Etc.) And Basic Care & Storage • Safety Practices Related to The Storage & Handling of Lubricants* |
| *1315 – 1420* | ***Risk Management for Lubricated Machines; Basic Elements***<br>*Basic Elements of Reliability-centered Maintenance (RCM) • The Pareto Principle & its Application to Establish Maintenance Strategy & Focus of Resources • Failure Patterns & Weibull Distributions Basic Elements • Ranking of Lubrication-Specific Failure Modes & Causes & the Use of Failure Modes Effects Analysis (FMEA) • Assessment of Equipment to Determine Failure Probability along with the Severity/Consequence of Failure • Basic Elements in Use of Hazard Analysis Critical Control Point (HACCP) (ISO 22000) to Localize & Control Risk in Lubricant-Dependent Machines & Systems* |
| *1420 – 1430* | ***Recap***<br>*Using this Course Overview, the instructor(s)will Brief Participants about the Topics that were Discussed Today and Advice Them of the Topics to be Discussed Tomorrow* |
| *1430* | *Lunch & End of Day Two* |

***Day 3: Tuesday, 15th of October 2024***

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| *0730 – 0900* | ***Optimum Machine Modifications and Features Needed to Achieve & Sustain Reliability Goals***<br>*Optimum Selection, Set-Up and Use of Lubricant Application Devices & Hardware (Single-Point Autolubers, Circulating Lubrication, Constant-Level Oilers, Centralized Lubrication Systems, Mist Systems, Spray, Etc.) • Optimum Selection, Installation & Use of Contamination Control Devices/Hardware (Filters, Breathers, Filter Cart Connects, Headspace Management, Seals, Dehydrators, De-Aeration Devices, etc.) • Instrumentation Requirements Including Selection & Location of Online Oil Analysis Sensors • Optimum Selection, Location & Use of Sight Glasses & Level Gauges • Optimum Selection & Use of Relubrication & Oil Change Hardware & Tools • Optimum Selection & Location of Sampling Valves & Hardware • Purpose & Use of Drip Pans, Grease Traps, Berms, Purge Ports, Etc. • Optimum Selection & Use of Tags, Labels & Plates for Lubricant Type & Lubrication Practices on the Machine* |
| *0900 – 0915* | *Break* |

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| *0915 – 0945* | ***Lubricant Selection for Optimum Reliability, Safety, Energy Consumption & Environmental Protection Based on Machine Type & Application***<br>*Vendor Selection Based on Product Range, Product Quality, Product Performance, Support & Services • Elements in Generic Lubricant Specifications for Common Machine Types, Application Types, Operating Conditions, Workplace Exposures, Desired Machine Reliability, Safety Requirements, Energy Conservation, Environmental Protection & Price. Common Machine or Application Types include Engines, Driveline Components, Rolling-Element Bearings, Journal Bearings, Enclosed & Open Gears, Mechanical Couplings, Process Pumps, Hydraulic Systems, Compressors, Gearboxes, Turbines, Chain and Wire Rope, and Pneumatic Systems. Lubricant Specification Elements include Base Oil, Additives, Thickeners, Performance Properties, Physical Properties, Chemical Properties, and Health and Safety Properties. • Food Grade Lubricant Selection, Application & Regulations Related to National Sanitation Foundation (NSF), Food Safety Modernization Act (FSMA), ISO 22000 (HACCP), ISO 21469 & Similar Guidelines* |
| *0945 – 1015* | ***Lubricant Selection for Optimum Reliability, Safety, Energy Consumption & Environmental Protection Based on Machine Type & Application (cont'd)***<br>*Rationalized Lubricant Consolidation to Optimize the Number of Lubricant Grades and Brands • Lubricant Cross-Contamination Risks, Compatibility Testing, and Risk-Management Practices • Proper Labeling Methods Using Standardized Classifications & Visual Identification System for Display on Machines, Containers, Grease Guns, Lubricant Transfer System, Etc. Standardized Classifications Relate to Internal and Industrial Standards including ISO 15380, ISO 12924/6743/12925 and Many Others Related to Engine Oils, Transmission Fluids, Axle Lubricants, and Brake Fluids. These also include ILSAC, ACEA, API and SAE* |
| *1015 – 1115* | ***Lubrication-Related Planning, Scheduling & Work Processing***<br>*Routine Scheduled Work & PMS • Unplanned & Condition-Based Work Request Processing • Work Prioritization & Planning • Work Kitting, Matching Skill Competencies to Tasks, Assembly of Work Crews • Work Scheduling • Unplanned & Planned Work Backlog Management • Process for Troubleshooting Faults & Anomalies (see also Major Subject 16) • Record Keeping, Documentation, CMMS* |
| *1115 – 1215* | ***Periodic Lubrication Maintenance Tasks***<br>*Control of Correct Lubricant Supply: Oil Level, Flow Rate, Drip Rate, Mist Rate or Grease Volume • Regrease, Oil Top-Up & Oil Change Frequency & Lubricant Volume (Amount) Criteria • Proper Oil Top-Up Procedures for Common Machine Types, Sumps & Reservoirs • Proper Grease Relubrication Procedures for Common Machine Types & Grease Dispensing Hardware • Lubricant Drain or Purge Criteria & Methods for Major Machine Types • Contamination Control Tasks Including General Machine Cleanliness, Control of Contaminant Ingression, Filtration, Dehydration & Other Decontamination Methods • Machine Flushing Requirements, Risks & Benefits. Selection of Flushing Protocol, Hardware & Methodology • Oil Reclamation Need & Methods • Lubricant Waste Handling, Disposal & Cleanup • Leak Detection, Management & Leak Cleanup • Safety in Lubrication Maintenance Tasks* |

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| *1215 – 1230* | *Break* |
| *1230 – 1420* | ***Inspection of Lubricated Machines for Optimum Reliability, Safety,*** |

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| | ***Environmental Protection & Condition Monitoring***<br>*Inspection Personnel & Responsibility (Recognizing this Vary Between Operators, Lube Technicians, Mechanics, and Reliability Engineers) • Inspection Intervals, Routes, Autonomous Inspection • Selection & Installation of Machine Inspection Windows • Selection, Use & Care of Inspection Tools & Aids • Inspection Protocol for Common Machine Types Related to Start-Up, Machine-Run Conditions, Machine-Stop Conditions, Repair Inspection • Inspection Protocol for Spare Parts, Stored New Machines & Standby Machines • Inspection Personnel Skill Sets & Training • Inspection Checklists, Findings Reports and Documentation • Integration of Inspection with Other Condition Monitoring Practices* |
| *1420 – 1430* | ***Recap***<br>*Using this Course Overview, the instructor(s)will Brief Participants about the Topics that were Discussed Today and Advice Them of the Topics to be Discussed Tomorrow* |
| *1430* | *Lunch & End of Day Three* |

***Day 4: Wednesday, 16th of October 2024***

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| *0730 – 0900* | ***Lubricant Analysis & Condition Monitoring for Optimum Reliability Objectives***<br>*Selection of Optimum Sampling Tools/Devices, Sample Point Location(s), Sampling Frequency, & Procedure for Common Machines, Operating Conditions & Reliability Objectives • Selection of Off-Site Laboratory Requirements Based on Instrument/Sample Prep Capabilities, Industry Orientation, Quality, Turnaround Time, Data Reporting Format & Data Interpretation Capabilities • Selection of Onsite Testing Tools/Laboratory Requirements • General In-Service Lubricant Sampling & Analysis Program Design • New Lubricant Receiving Requirements: Testing, Inspection & Quality Control • Stored Lubricant (Package & Bulk) Sampling & Analysis • Selection of Routine Lubricant Test Slate & Standardized Methods* |
| *0900 – 0915* | *Break* |
| *0915 – 1015* | ***Lubricant Analysis & Condition Monitoring for Optimum Reliability Objectives (cont'd)***<br>*Selection of Exception Tests, Condition for Use & Standardized Methods • Selection of Data Alarms & Limits • General Strategy for Data Interpretation • Data Management & Overall Program Management • Reporting & Responding to Non-Conforming Data • Integration with Other Inspection & Condition Monitoring Methods • Accuracy & Quality Verification & Accreditation (e.g., ISO 17025)* |
| *1015 – 1145* | ***Fault/Failure Troubleshooting, Root Cause Analysis (RCA) & Remediation***<br>*Basic Problem Troubleshooting Procedures & Guidelines • Application of Failure Management & Processes, e.g., the Use of FRACAS Policies (Failure Reporting, Analysis & Corrective Action System) • General RCA Policies & Guidelines • RCA Phases: Data Collection, Assessment, Corrective Action, Inform & Follow-Up • Data Collection & Evidence Preservation Policies • Root Cause Assessment Methods: Fault Trees, Cause-&-Effect, Sequence of Events, Etc. • Guidelines for Responding to Root Cause Conditions • Guidelines for Responding to Incipient Failure/Faults • Guidelines for Responding to Impending/Precipitous Failure • Sudden-Death or Catastrophic Failure Guidelines • Guidelines for Fault/Failure Findings from Rebuild Shops* |

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| *1145 – 1230* | ***Supplier Compliance/Alignment & Procurement of Services & Products***<br>*Supplier & Service-Provider Alignment/Commitment to Reliability, Safety, Energy Consumption, Quality & Environmental Protection Goals • Incoming Lubricants, Parts & Machine Product Acceptance Testing/Inspection • Certificate-of-Analysis of Lubricant Supplies • Internal/External Cleanliness & Packaging of New or Rebuilt Components/Parts. Roll-off Cleanliness of Final Machine Assemblies • Lubricant Supply Agreement Terms & Conditions Related to Quality & Services Provided • Supplier Safety & Lubricant Quality Communications & Documentation • Services of Off-Site Service Providers & Rebuild Shops (Quality, Part Cleanliness, Roll-Off Cleanliness, Documentation, Findings Reports, Etc.)* |
| *1230 – 1245* | *Break* |
| *1245 – 1345* | ***Waste & Used Lubricant Management & Environmental Compliance***<br>*Disposal of Lubricants, Filters, Rags, Containers • Cleaning of Containers, Parts, Hoses, Components & Devices • Labeling & Documentation of Hazardous Waste & Non-Hazardous Materials • Disposal of Hazardous & Non-Hazardous Materials • Alignment to ISO 14000* |
| *1345 – 1420* | ***Energy Conservation & Environmental Protection***<br>*Influence of Lubricants & Lubrication on Energy Conservation • Influence of Lubricants on Atmospheric Contamination • Environmental-Friendly Lubricants (E.G., Biodegradability) • Lubricant Aqueous Toxicity, Risk & Assessment • Organizational Goals & Policies Related Conservation & Protection of the Environment • Optimized & Practical Use of Lubricants & Lubrication Conservation & Environment Protection* |
| *1420 – 1430* | ***Recap***<br>*Using this Course Overview, the instructor(s)will Brief Participants about the Topics that were Discussed Today and Advice Them of the Topics to be Discussed Tomorrow* |
| *1430* | *Lunch & End of Day Four* |

***Day 5:*** ***Thursday, 17th of October 2024***

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| *0730 – 0830* | ***Health & Safety***<br>*Disposal & Waste Management • Safety Training, Policies & Guidelines • Hazardous Lubricants & Toxicity • Microbial Safety Risks & Control of Transmission (to Other Machines) • Fluid Pressure & Fluid Injection Risks (Blood Stream Injection) • Lubricant Mists in the Work Environment • Confined Space Risks • Fire & Combustion Risks • Electrocution Risks • Other Mechanical Risks* |
| *0830 – 0930* | ***Oil Reclamation, Decontamination, De-varnishing & Additive Reconstruction***<br>*Lubricant Conservation Strategy & Practices Related to Extended Lubricant Service Life • Selection of Dehydration Methods & Practices • Additive Reconstruction of Aged or Damaged Lubricants • De-Varnishing of Fluids & Machine Surfaces • Acid Scavenging Methods, Best Applications & Risks* |
| *0930 – 0945* | *Break* |
| *0945 – 1015* | ***Lubrication During Standby, Storage & Commissioning***<br>*Special Lubrication Requirements Related to Machine Commissioning & Running-In Conditions • Special Lubrication-Related Practices to Protect Machines & Parts in Storage or Standby* |

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| *1015 – 1200* | ***Program Metrics***<br>*Fundamental Elements in Metrics & Performance Measures • Micro Metrics of Machines & Lubricant Conditions • Macro & Big-Picture Metrics for Overall Fleet or Plant Machine Health • Mapping & Aligning Metrics to Return on Net Assets (RONA) • Overall Equipment Effectiveness (OEE) (Related to Asset Utilization) • Leading Metrics that Predict Future Conditions or Events (What's Going to Happen) • Lagging Metrics that Report or Summarize Past Conditions or Events (What Just Happened) • Overall Lubrication Performance & Compliance Metrics Related to Cleanliness Compliance, Lubricant Health & PM Compliance • Lubricant Consumption Ratios/Metrics • MTBF & General Machine Reliability Metrics • Route Compliance Measurement • Percent Planned Maintenance, Workforce Efficiency, Wrench Time • Metric Communication • Performance Control & Remediation* |
| *1200 – 1215* | *Break* |
| *1215 – 1345* | ***Continuous Improvement***<br>*Culture of Continuous Improvement •Improved Data Analytics • Improved CBM Sensor Application & Scope • Improved Cost Reductions • Improved Production Output • Improved Energy Consumption • Improved Environmental Protection • Improved Safety • Improved Product Quality & Timely Delivery • Improve Profitability* |
| *1345 – 1400* | ***Course Conclusion*** |
| *1400 – 1415* | ***POST-TEST*** |
| *1415 – 1430* | *Presentation of Course Certificates* |
| *1430* | *Lunch & End of Course* |

## MOCK Exam

Upon the completion of the course, participants have to sit for a MOCK Examination similar to the exam of the Certification Body through Haward's Portal. Each participant will be given a username and password to log in Haward's Portal for the MOCK exam during the 7 days following the course completion. Each participant has only one trial for the MOCK exam within this 7-day examination window. Hence, you have to prepare yourself very well before starting your MOCK exam as this exam is a simulation to the one of the Certification Body.

## Practical Sessions

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

## Course Coordinator

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