



MLA I / MLT I ICML CERTIFICATION ISO 18436-4, CATEGORY I

PLANT SUSTAINABILITY THROUGH WEAR DEBRIS & OIL ANALYSIS

International Council for Machinery Lubrication



Course Period : 4 Consecutive Days



ICML Exam : 4th Day

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Introduction

Plant Sustainability Through Wear Debris & Oil Analysis

is a foundation-level intensive course structured around the ICML Body of Knowledge for Machinery Lubrication Analyst Level I (MLA I) and Machinery Lubrication Technician (MLT I). It equips maintenance and reliability professionals with the essential skills to collect and handle oil samples, identify lubricant contamination, degradation, and wear, and interpret analysis results to diagnose machine health. The course also emphasizes the integration of oil analysis into reliability-based maintenance programs, enabling participants to design effective monitoring strategies that reduce failures, improve equipment uptime, and support sustainable plant performance.

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➔ Training Objectives

By the end of this program, participants will be equipped with the knowledge and practical skills to:

- Diagnose abnormal lubricant and machine conditions, make informed decisions, and oversee corrective actions.
- Effectively communicate the role and value of lubricant analysis within a Reliability-Centered Maintenance (RCM) strategy to managers, supervisors, and lubrication teams.
- Implement proactive lubrication monitoring practices to reduce failure rates and extend equipment life.
- Manage lubricant analysis data and utilize associated software tools for improved decision-making.
- Evaluate third-party oil analysis services and recommend improvements where necessary.
- Use oil analysis to ensure lubricant supplier quality and specification compliance.
- Develop and oversee standardized procedures for lubricant sampling, handling, and analysis.
- Select and apply appropriate on-site oil analysis instruments as needed.
- Integrate oil analysis with other condition monitoring technologies for a comprehensive maintenance approach.
- Financially justify and optimize the lubricant analysis program within the broader maintenance strategy.

Course Outline₁

MODULE I.

Maintenance Strategies

- Why machines fail
- The impact of poor maintenance on company profits
- The role of effective lubrication in failure avoidance
- Lube routes and scheduling
- Oil analysis and technologies to assure lubrication effectiveness.
- Equipment tagging and identification.

MODULE II.

Lubrication Theory/Fundamentals

- Fundamentals of tribology
- Functions of a lubricant
- Hydrodynamic lubrication (sliding friction)
- Elasto-hydrodynamic lubrication (rolling friction)
- Mixed-film lubrication
- Base-oils
- Additives and their functions
- Oil lubricant physical, chemical and performance properties and classifications.
- Grease lubrication
 - How grease is made
 - Thickener types
 - Thickener compatibility
 - Grease lubricant physical, chemical and performance properties and classifications.

MODULE III.

Lubricant Selection

- Viscosity selection
- Base-oil type selection
- Additive system selection
- Machine specific lubricant requirements
 - Hydraulic systems
 - Rolling element bearings
 - Journal bearings
 - Reciprocating engines
 - Gearing and gearboxes
- Application and environment related adjustments.

MODULE IV.

Lubricant Application

- Basic calculations for determining required lubricant volume.
- Basic calculations to determine re-lube and change frequencies.
- When to select oil, when to select grease.
- Effective use of manual delivery techniques.
- Automatic delivery systems.
 - Automated deliver options.
 - a) Automated grease systems
 - b) Oil mist systems
 - c) Drip and wick lubricators
 - Deciding when to employ automated lubricators.
 - Maintenance of automated lubrication systems.





Course Outline₂



MODULE V. **Lube Storage and Management**

- Lubricant receiving procedures.
- Proper storage and inventory management.
- Lube storage containers
- Proper storage of grease-guns and other lube application devices.
- Maintenance of automatic grease systems.
- Health and safety assurance.

MODULE VI. **Lube Condition Control**

- Filtration and separation technologies.
- Filter rating.
- Filtration system design and filter selection.

MODULE VII. **Oil Sampling**

- Objectives for lube oil sampling
- Sampling methods
- Managing interference
 - Bottle cleanliness and management
 - Flushing
 - Machine conditions appropriate for sampling

MODULE VIII. **Lubricant health monitoring**

- Lubricant failure mechanisms
 - Oxidative degradation
 - Thermal degradation
 - Additive depletion/degradation
- Testing for wrong or mixed lubricants
 - Baseline physical and chemical properties tests
 - Additive discrepancies
- Fluid properties test methods and measurement units - applications and limitations.
 - Kinematic Viscosity (ASTM D445)
 - Absolute (Dynamic) Viscosity (ASTM D2983)
 - Viscosity Index (ASTM D2270)
 - Acid Number (ASTM D974 et al)
 - Base Number (ASTM D974 et al)
 - Fourier Transform Infrared (FTIR) analysis
 - Rotating Pressure Vessel Oxidation Test (ASTMD2272)
 - Atomic Emission Spectroscopy

MODULE IX. **Wear Debris Monitoring & Analysis**

- Common machine wear mechanisms





Machine Lubricant Analyst, Level I (ISO 18436-4, I)

Requirements:

1. Work Experience

At least 12 months of hands-on experience in lubricant analysis for machinery condition monitoring (based on a minimum of 16 hours per month).

2. Formal Training

Complete 24 hours of documented training that follows the MLA I Body of Knowledge.

- Can include classroom, online, or blended learning.
- A maximum of 4 hours can be self-paced or recorded sessions.
- Training records must show your name, course dates, instructor's name/signature, and total hours.

Note: ICML does not endorse any specific training provider. It's the candidate's responsibility to ensure the course covers all topics in the official Body of Knowledge.

3. Examination

Pass a 100-question closed book multiple-choice exam within 3 hours.

- A score of 70% or higher is required to pass.
- Exam may be available in other languages—check with ICML for options.





Machinery Lubrication Technician, Level I

Requirements:

1. Education and/or Experience

Candidates must have at least two years education (post-secondary) or on-the-job training in one or more of the following fields: machine lubrication, engineering, mechanical maintenance and/or maintenance trades.

2. Formal Training

Complete 16 hours of documented training that follows the MLT I Body of Knowledge.

- Can include classroom, online, or blended learning.
- A maximum of 3 hours can be self-paced or recorded sessions.
- Training records must show your name, course dates, instructor's name/signature, and total hours.

****Note: ICML does not endorse any specific training provider. It's the candidate's responsibility to ensure the course covers all topics in the official Body of Knowledge.*

3. Examination

Pass a 100-question closed book multiple-choice exam within 3 hours.

- A score of 70% or higher is required to pass.
- Exam may be available in other languages—check with ICML for options.





Who Should Attend

Whether you're working on the shop floor or managing assets and maintenance strategies, this course provides valuable knowledge to enhance reliability and plant performance.

This course is ideal for individuals involved in lubrication, maintenance, and machinery condition monitoring, including but not limited to:



Maintenance
Technicians or
Engineers or
Managers



Lubrication
Technicians or
Engineers or
Managers



Reliability
Engineers or
Managers



Industrial and
Manufacturing
Engineers



Rotating
Engineers



Sales and
Field Service
Engineers

***And anyone responsible for or interested in lubrication practices and oil analysis.



Register Now

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