

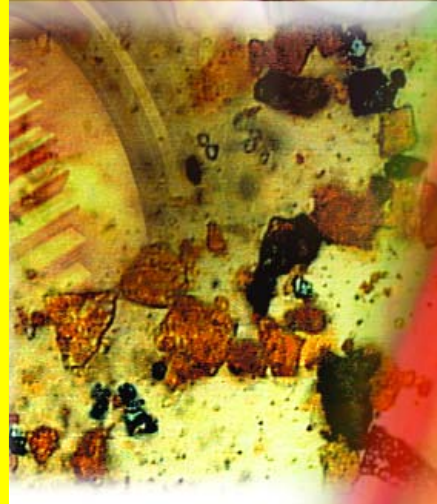
Gain Years Worth of Knowledge in 5 Weeks!

Lubrication Technologist

Five Weeks of In-depth
Lubrication and
Oil Analysis Training

Training

Transform operators,
maintenance and craftsman
into skilled lubrication
technologists.



Course Highlights

Lubricants and Lubrication:

Fundamental Science of Lubrication, Lubricant Development, Lubricant Selection, Lubricant Application Volume and Frequency, Lubricant Storage and Contaminant Free Handling

Machine Modification:

Sealing Improvements, Breather Upgrades, Filtration Upgrades, Sample Port Location and Test Fixture Selection, Gauges and Level indicators

Oil Analysis:

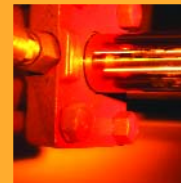
Contamination Cause and Effect, Contaminant Identification and Measurement Methods, Contaminant Exclusion and Removal Technology Review

Contamination Control:

Exclusion, Removal, Technologies, Methods, Best Practices

Certification:

Level I MLA and MLT Preparation and Testing



Comprehensive Training

A to Z

Noria's Lubrication Technologist Training is geared toward providing practical hands-on training for those on the frontlines of lubrication - Machinery Lubrication Technicians.

Are you trying to launch precision lubrication at your facility? You need motivated, seasoned and skilled troops prepared to execute the right plan, based on the right vision. Noria has developed an in-depth, 5-week training program designed to equip the modern Lubrication Technician with the knowledge to drive a world-class lubrication program.

This program incorporates the body of content from Noria's industry-leading Machinery Lubrication Level I and II, and Oil Analysis Level I and II training courses. Set in a practical, interactive forum, the learning pace is brisk enough to challenge, but still allows for the student to ask questions and correlate the new knowledge to real-life experiences.

Your Blueprint for Success

High intensity training is a proven method for learning new languages and developing extensive technical knowledge in the shortest possible timeframe. This approach will enable the student to rapidly assimilate the body of knowledge so that he/she can make the right decisions the first time without wasting time or deliberating over otherwise perplexing details. Before you know it, the training will end and you'll be able to make informed, results-producing decisions at your facility. You'll learn in weeks what would normally take years of experience to obtain.

Skilled, Confident Lubrication Technicians

Is your lubrication program one of the Key Success Factors the site depends upon to achieve the reliability goals? Do you have skilled technicians that are clearly capable of supporting those goals? Extensive review and problem solving exercises help to instill solid confidence in technicians, which enables plant floor leadership to develop in this critical area. Your technicians can become unwavering supporters and enablers for the sites developing World Class Lubrication Programs.

Instruction Method and Material

The Noria senior technical staff serves as course instructors, providing 90 years worth of practical experience and theoretical study in support of this 5-week educational experience. The attendee will graduate the class after sitting for the ICML (International Council for Machinery Lubrication) Level I Machine Lubrication Technician and Level I Machine Lubricant Analyst certifications. The attendee will also compile nearly 1,500 pages of technical references, instructional guides, problem solving aids and texts that can serve as the foundation for a Tribology plant database for years to come. The personal knowledge and the ready resources provide ample support for the development of reliability centered lubrication practices, regardless of the operating environment.



For Current Course Schedule and More Information Go To:

www.noria.com/lubetech

Find Out More

Request a full agenda and to receive more detailed information and pricing - call or e-mail Stacey McCauley at 662-890-9392 or smccauley@noria.com



Weekly Agenda



Begins with a detailed exploration of lubrication theory, lubricant development and performance measurement.

Each segment throughout the course will have a pre-test and a post-test to validate the content.

Week 1

Class time = 35 hours

- **Review of Scope for Entire Training Program**
- **Review of ICML Test Body of Knowledge - MLT I**
- **The Role of Lubrication in Machine Reliability**

LUBRICANT FUNDAMENTALS CONTENT

LUBRICANT CONSTRUCTION

- Base Oils
- Additives
- Thickeners

LUBRICANT PERFORMANCE PROPERTIES

- Viscosity
- Viscosity Index
- Oxidation
- Thermal Degradation
- Combustion Engine - Soot and Dispersancy
- Corrosion Control
- Air Control
- Moisture Control
- Friction and Wear Control
- Other properties

LUBRICANT PERFORMANCE MEASUREMENT

PERFORMANCE OF GREASES

- Consistency and Slumpability
- Mobility
- Water washout
- Thermal Stability
- Separation Stability

Food grade and Ecologically Acceptable Lubricants

Review and Contrast of Various Product

Performance Measurements

Vendor Presentation:
Visit a Lubricant Manufacturing Site

Exercise: Viscosity Measurement Methods

Exercise: Viscosity Blending Methods

Exercise: Projecting Viscosity Grades at Various Temperatures

Week 2

Class time = 35 hours

- **The second week addresses issues pertaining to oil and grease application, product handling and contamination control**

GREASE APPLICATION

Dispensing Tools

Dispensing Metrics - Frequency and Volume

Exercise: Various methods for calculating viscosity requirements and contrast of the results

Bearing Characteristics which influence lubrication
Application Discussion - Motors
Feedback tools
Temperature
Ultrasonic feedback

Automation

Single Point Lubricators
Single Line Parallel
Dual Line Parallel
Single Line Progressive (Series) systems
Oil Application Methods

Viscosity Selection Exercise

Application Methods

Hand Application
Drip
Wick
Splash
Bath
Force Feed
Circulation
Once Through
Oil Mist

CONTAMINATION CONTROL

- Solid Contaminant
- Moisture Contaminant
- Heat Contaminant
- Air Contaminant
 - Desiccant
 - Mechanical
 - Bladders and Bags

Exercise: Disassemble various types of breather filter elements and discuss where failures could occur

Vendor Presentation:

Review of Bearing Isolators and other sealing technology

Seal Product Function, Installation and Type Review

- Lip Seals
- Bearing Isolators
- Mechanical Seals
- Cylinder Boots

Vendor Presentation:

Review of element design and construction

Filter Product Review

- Mechanical Elements
- Vacuum Distillation
- Thermal Exchange
- Centrifugal
- Electrostatic Separation

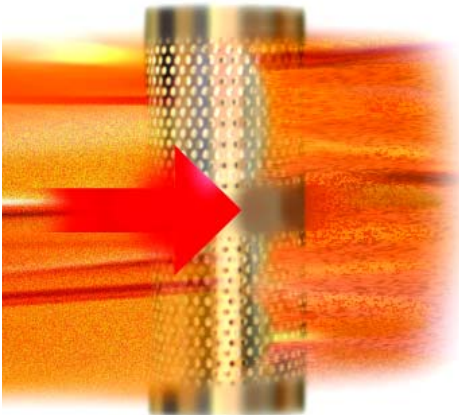
LEAKAGE STABILITY

- Lubricant Consolidation, Handling and Vendor Selection
- Bulk and Packaged Product Storage and Handling
- In Plant Handling and Management

Exercise: Discussion on product type, selection and utility

Exercise: Lubricant and Vendor Consolidation and Selection

Review - first two weeks



Week 3

Class time = 35 hours

In week 3 instructors will begin to focus on matching the theoretical issues to the practical exercise of lubricant review and selection for all the major types of lubricated components.

LUBRICATION PM OPTIMIZATION AND DESIGN

Exercise: Develop a Lubrication PM Chart for a type of mechanical process / operation / machine center. Use existing Excel model or paper model.

APPLICATION SPECIFIC SELECTION

Combustion Motor Lubricants

Exercise: Case Analysis - lubricant selection

Exercise: Case Analysis - contamination control

Bearing Lubricants

Exercise: Case Analysis - lubricant selection

Exercise: Case Analysis - contamination control

Gear and Coupling Lubricants

Exercise: Case Analysis - lubricant selection

Exercise: Case Analysis - contamination control

Compressor and Refrigeration Systems Lubricants

Exercise: Case Analysis - lubricant selection

Exercise: Case Analysis - contamination control

Turbine Lubricants

Exercise: Case Analysis - lubricant selection

Exercise: Case Analysis - contamination control

Hydraulic Lubricants

Exercise: Case Analysis - lubricant selection

Exercise: Case Analysis - contamination control

Wire Rope, Chain and Miscellaneous Lubricants

Exercise: Case Analysis - Wire Ropes and Chains

Vendor Presentation:

Automatic Lubrication Systems - system operation and inspection.

LUBRICATION FAILURE PROBLEMS AND SYMPTOMS

Week 4

Class time = 23 hours

Lab time = 12 hours

In the fourth week instructors will introduce proactive oil analysis system development and lubricant data analysis, including equipment design for repeatable sample collection, and integrate the new content into the previous lessons.

INTRODUCTION TO OIL ANALYSIS

OIL ANALYSIS STRATEGIES

OIL SAMPLING BEST PRACTICES

Lab: Equipment Analysis - Sampling Location Selection

PROPERTIES ANALYSIS

- Viscosity and viscosity index degradation
- Oxidation and corrosion via AN and BN
- Additive depletion via FTIR, Cyclic Voltammetry
- Additive and Wear metals detection
- Contaminant detection
- Secondary Tests
- Simple Field Tests to Measure these properties
- Color Test
- Blotter Test
- Air Separation
- Moisture Separation
- Crackle Test

Exercise: Case Analysis - fluid properties

Vendor Presentation

Exercise: Ultra Sonic Energy Systems

Exercise: Visit to an Oil Analysis Laboratory -

□ Design Stage

□ Field Retrofit

- Sample Port Selection
- Breather Upgrade
- Filtration Fitting Upgrade
- Product Selection and Installation

□ Lab: Equipment Analysis - Accessory Selection

RESERVOIR MANAGEMENT

- Drains
- Fills
- Flushes

Exercise: Case Example - exercise with machine tool system retrofits.

WEAR DEBRIS ANALYSIS

- Understanding and Analyzing Machine Wear
- Particle Morphology
- Technology and Instrumentation

Exercise: Case Analysis - machine wear

□ Selecting Analysis Test Slate, Alarms and Limits

Advanced Exercise: Comprehensive Case Analysis and Practice Development, including:

- Performing a Machine Lubrication Study
- Selecting an Analysis Slate, Alarms and Limits ••
- Oil Analysis Report and Data Interpretation
- Mechanical Inspection Methods
- Inspection Tools
- Oil Analysis and Mechanical Inspection Integration

Week 5

Class time = 32 hours

Exam time = 4 hours

■ In the fifth and final week of this intense study, the students will spend two additional days integrating the concepts and details that they have learned through several case analyses and problem solving exercises.

With the remaining three days the students will return to and review all the content from the initial week, providing one last opportunity to clarify and reinforce concepts and technical details prior to the exam.

The International Council of Machinery Lubrication will administer the Level 1 exams for both oil analysis and machine lubrication technologies on the morning of the final day.

ADVANCED INTEGRATION

(Continued)

Exercise: Case Studies - Oil Analysis and Mechanical Inspections Integration

MLT I

content final review and exam preparation (8 hours)

MLA I

content final review and exam preparation (8 hours)

ICML

Machine Lubricant Analyst
Level 1 Certification Exam

ICML

Machine Lubrication Technician
Level 1 Certification Exam

