DAY 1

I. Maintenance Strategies

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

II. Lubrication Theory/Fundamentals

A. Fundamentals of tribology
B. Functions of a lubricant
C. Hydrodynamic lubrication (sliding friction)
D. Elasto-hydrodynamic lubrication (rolling friction)
E. Mixed-film lubrication
F. Base-oils
G. Additives and their functions
H. Oil lubricant physical, chemical and performance properties and classifications.
I. Grease lubrication

III. Lubricant Selection

A. Viscosity selection
B. Base-oil type selection
C. Additive system selection
D. Machine specific lubricant requirements
E. Application and environment related adjustments.

DAY 2

IV. Lubricant Application

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

V. Lube Storage and Management

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

VI. Lube Condition Control

A. Filtration and separation technologies.
B. Filter rating.
C. Filtration system design and filter selection.

DAY 3

VII. Oil Sampling

A. Objectives for lube oil sampling
B. Sampling methods
C. Managing interference
1. Bottle cleanliness and management
2. Flushing
3. Machine conditions appropriate for sampling

VIII. Lubricant health monitoring

A. Lubricant failure mechanisms
1. Oxidative degradation
a) The oxidation process
b) Causes of oxidation
c) Effects of oxidative degradation
2. Thermal degradation
a) The thermal failure process
b) Causes of thermal failure
c) Effects of thermal degradation
3. Additive depletion/degradation
a) Additive depletion mechanisms
b) Additives at risk for depletion degradation
B. Testing for wrong or mixed lubricants
1. Baselining physical and chemical properties tests
2. Additive discrepancies

DAY 4

VIII. Lubricant health monitoring (cont.)

C. Fluid properties test methods and measurement units - applications and limitations.
1. Kinematic Viscosity (ASTM D445)
2. Absolute (Dynamic) Viscosity (ASTM D2893)
3. Viscosity Index (ASTM D2270)
4. Acid Number (ASTM D974 et al)
5. Base Number (ASTM D974 et al)
6. Fourier Transform Infrared (FTIR) analysis
7. Rotating Pressure Vessel Oxidation Test
(ASTMD2272)
8. Atomic Emission Spectroscopy
D. Wear Debris Monitoring and Analysis
1. Particle Quantifier Index
2. Laser Particle Counting
3. Laser Net Fines
4. Direct Read Ferrography
5. Analytical Ferrography
E. Data Interpretation
1. Wear
2. Contamination
3. Condition
4. Performance
5. Trending
6. Setting Alarm Limits
7. Establishing and Managing KPIs

DAY 5

MLA Exam

3 Hours, 100 questions, multiple choice.
No reference materials allowed.