

# World-Class Reliability

## An Invitation To:

All Maintenance Professionals  
Predictive Maintenance Technicians  
Reliability Engineers  
Lubrication Engineers  
Craftsmen and Millwrights  
Equipment Operators  
Maintenance Managers  
Operations Managers  
Vibration Instrument Specialists  
Manufacturing and Industrial Engineers  
Maintenance Supervisors  
Laboratory Analysts

**Power Generation • Petrochemicals • Transportation  
Automotive Manufacturing • Pulp & Paper • Earth-moving  
Primary Metals • General and Process Manufacturing**

## Attend This Industry-Leading Seminar:

Certification Series

# Oil Analysis

New 2007 Schedule

Most maintenance programs achieve only 10 percent of the benefits available from oil analysis. Learn how to get the most out of oil analysis by attending these powerful training sessions.



**CRE**  
Center for Reliability Excellence  
KONTRAKTWERKE INC.

### You Will Learn How To:

- Read and understand oil analysis reports
- Tell if you are using the wrong oil
- Squeeze maximum life out of lubricants
- Set optimum oil analysis limits
- Reduce oil consumption for easy, near-term savings



## Oil Analysis Blunders

**Don't Let These Happen To You...**

- A large steel mill wanted to get every machine ready for easy oil sampling. After installing more than 1,200 oil sampling ports, it started getting strange data on its oil analysis reports. After investigation, it was found that each of the new sample ports was installed in the wrong location.
- A lubrication technician was in charge of changing oil filters on several large hydraulic systems. He changed filters only when the differential pressure gauge indicated it was time. He noticed that one of the filters never seemed to need changing because the gauge never moved. After losing a couple of pumps, it was discovered that there was a large hole in the filter, which did not allow the pressure to rise.
- A company performing oil analysis for several years wondered why it was never able to detect bearing faults. After its program was audited, it was discovered that the tests being conducted were not capable of detecting impending failure. Instead, these tests were designed to identify wrong or degraded lubricant only.

We guarantee you'll be very satisfied with the vital skills, powerful techniques and important insights you gain from this information-packed course. You will have a wealth of hard-hitting oil analysis know-how to gain!

### If You Have Any of the Following Machines, This Training is a Must:

- Gear Boxes • Hydraulic Systems • Motor Bearings • Compressors  
• Final Drives • Diesel Engines • Paper Machines • Process Pumps  
• Steam Turbines • Gas Turbines • Rolling Mills • Fans /Blowers  
• Hydrostatic Transmissions**

# Learn the “Best Practices” of Oil Analysis

## Who Should Attend?

All Maintenance Professionals  
Predictive Maintenance Technicians  
Reliability Engineers  
Lubrication Engineers  
Craftsmen and Millwrights  
Equipment Operators  
Maintenance Managers  
Operations Managers  
Vibration Instrument Specialists  
Manufacturing and Industrial Engineers  
Maintenance Supervisors  
Laboratory Analysts

## Industries That Will Benefit From These Courses:

Power Generation  
Petrochemical  
Pulp and Paper  
Primary Metals  
Process Manufacturing  
Automotive Manufacturing  
Transportation  
Earthmoving  
Municipal Utilities  
Aerospace  
General Manufacturing

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Paper Machines  
Process Pumps  
Steam Turbines  
Gas Turbines  
Blowers / Fans  
Rolling Mills  
Hydrostatic Transmissions

## Expand Your Oil Analysis Skills

### And Get Better Results...A Whole Lot Faster!

If you're like many users, you may already be winging your way around oil analysis. You may be using it exclusively to predict catastrophic failures. Or, you may be basing your oil drains on the recommendations of your oil analysis lab. Either way, you probably know there's a lot about oil analysis you haven't mastered...and you might be wondering what you are missing. Wouldn't you like to know ALL about what oil analysis can do for you? Now you can!

### You'll Learn More than Just Oil Analysis

Extending oil and machine life are two of the primary goals of oil analysis, but analyzing the oil won't make the oil or machine last any longer. That's why Jim Fitch's proven strategy for extending machine and lubricant life by up to 10X is the cornerstone of this presentation. You will learn how to select the right lubricants and filters and how small adjustments to your lubricant properties can result in huge savings. Vibration and Oil Analysis – Learn various strategies of leading maintenance organizations for integrating vibration, reliability-centered maintenance and oil analysis.

## Benefits of ICML Certification

### Benefits of Certification to Individuals

Earning an ICML certification acknowledges your expertise in machinery lubrication and/or oil analysis to troubleshoot and ensure reliability of lubricated equipment. The lubrication and oil analysis community, your employer, clients and peers will recognize your ICML credential as a symbol of the skills and knowledge you've gained through experience. ICML certification shows that you are a professional with the ability to successfully utilize machinery lubrication and/or oil analysis for your organization or client.

As an ICML Certified professional you also receive the following benefits:

- Industry recognition of your knowledge and proficiency in machinery lubrication and/or oil analysis techniques.
- Logos and certificate to enable you to identify your ICML certified status to colleagues or clients.

### Benefits of Certification to Employers and Organizations

Through certification, organizations can maximize their return on investment in oil analysis. ICML certification delivers the following benefits:

- A standardized method of determining training needs and measuring results
- A reliable benchmark for hiring, promoting and career planning
- Employee recognition and rewards that validate their expertise
- Improved employee ability to ensure machine reliability
- Quality assurance for outsourced oil analysis and lubrication services

### Benefits to the Oil Analysis Community

Certification brings much-needed credentials to an up and coming lubrication and oil analysis community. Benefits to the community include:

- Respect for oil analysis and lubrication professions
- Increases professionalism within the community

## Join World-class Companies

Join this list of world-class companies in implementing an oil analysis program to reduce costs and unplanned downtime. Some of the many companies benefitting from our seminars include:

3M	Georgia Power
76 Lubricants	Goodyear
Air Products	Great Lakes Chemical
Akzo Nobel	HB Zachry
Alabama Power	Intel
Alcoa	Houston Metro Transit
Allied Signal	International Paper
Alumax	John Deere
Ameren	Koch Industries
Arco	LaFarge Canada
BHP Copper	Lockheed Martin
BP Amoco	Lubrication Engineers
Bristol Myers	Lukens Steel
Boeing	M&M Mars
Boise Cascade	Michelin
Borg Warner	Northern States Power
Cargill	Nova Chemicals
Castrol	Owens Corning
Caterpillar	Oxy Chem
Centralia Mining	Pacific Gas & Electric
Chevron Citgo	Peabody Coal
Clopay	Phillips 66
Conoco	PPG Industries
Coors	Procter & Gamble
Destec Energy	Reliant Energy
Detroit Edison	Rio Tinto
Dow Chemical	Seattle Times
Dow Corning	Seminole Electric
Duke Power	Shell Oil
Dupont	Southern Companies
Eastman Kodak	Sun Company
Eli Lilly	Texaco
Entergy	Texas Instruments
ExxonMobil	Texas Utilities
First Energy	U.S. Army
Florida Power	U.S. Navy
Ford Motor Co.	U.S. Postal Service
Formosa Plastics	Via Rail Canada
General Motors	Westinghouse
General Electric	Weyerhaeuser
Geneva Steel	Whirlpool
Georgia Pacific	Willamette Industries

# Course Outline

## Introduction to Machine Lubrication

- Oil formulation and its importance in effective machinery lubrication
- Six key functions of lubricating oils
- Three primary lubrication regimes
- Introduction to base oils and additives
- Choosing the correct base-stock
- Conditions that dictate use of synthetic oils
- Antioxidant additives and their role in oil life
- Dispersants and detergents - the key to controlling soot
- Controlling wear with additive chemistry

## Oil Sampling - The Very Best Practices

- Six steps to reliable and easy oil sampling
- How to find the best sampling location
- Sampling splash-, collar- and ring-lubricated systems
- How to sample circulating systems
- Safe, effective high-pressure sampling from hydraulic systems
- Using primary and secondary sampling points
- A quick method for optimizing sampling intervals
- How clean should sample bottles be?
- Sampling valves and hardware recommendations

## Fundamentals of Friction and Machine Wear

- Four primary sources of friction in lubricated machinery
- 10 wear mechanisms that reduce machine life
- The most common wear modes in plain, rolling element and thrust bearings
- Understanding gearwear
- Understanding wear in hydraulic systems

## Machine Fault Detection and Debris Analysis

- How wear metals are measured using RDE and ICP spectrometers
- Measuring larger particles with Rotrode Filter spectroscopy
- Using ferrous density to determine the severity of a wear problem
- Using analytical ferrography for advanced fault detection
- Using ferrography for root cause analysis

## Fluid Properties Analysis

- Four common root causes of oil degradation
- Recognizing and controlling oil oxidation
- Monitoring lubrication degradation using acid number
- Monitoring lubricant health using FTIR
- Determining oil life using RPVOT
- Recognizing and controlling thermal failure
- How to recognize additive depletion or degradation

- Using paper chromatography (blotter spot test) to detect additive and base oil degradation
- Four ways to detect the addition of wrong oil

## Contamination Control and Proactive Maintenance

- Seven common contaminants
- Oil cleanliness and oil life extension benefits
- using the ISO Solid Contamination Code
- Proactive maintenance in three easy steps
- Case studies for proactive maintenance
- Portable filtration carts - three ways to use them
- Setting targets for oil cleanliness
- Detecting and controlling moisture contamination
- Selecting moisture removal / filtration methods
- The effects of heat on lubricants
- Controlling air entrainment and foam
- Glycol contamination
- Dealing with soot
- Understanding fuel contamination

## Instrument Free On-site Tests

- How to inspect vents and breathers
- Tips for effective sight glass inspection
- Getting valuable information from used filters
- Inspecting reservoirs for clues about lube trouble
- Scenting lubricants to find problems
- Getting visual clues from the oil sample before mailing it out
- Getting into particle analysis for under \$100
- Turn your kitchen blender into a test for demulsibility and foam tendency
- Screening for water with a simple hot plate
- How an unwanted business card can reveal oil degradation

## Interactive Workshop

- Individual and group participation in problem-solving exercises
- Exercises in how to read an oil analysis report
- ICML MLA Level I flashcard review session

### Lubrication Fundamentals

- Understanding full film, elastohydrodynamic and boundary lubrication
- Comparing solvent-refined, hydro-treated and hydro-cracked mineral base oils
- Advantages and disadvantages of the four most common synthetic base oil types
- Understanding API's five base oil categories
- Other base oil classification systems
- Overview of the 14 key additives that enhance lubricant performance
- Antioxidant additives and their role in oil life
- Controlling wear with additive chemistry

### Detecting and Troubleshooting Machine Wear

- Four primary sources of friction in lubricated machinery
- The 10 wear mechanisms that reduce machine life
- Beyond elemental spectroscopy - detecting large wear particles
- Using analytical ferrography for advanced root cause failure analysis
- Using magnetism, light and heat treatment with ferrograms
- Tips for chemical microscopy - oil analysis forensics
- The advantages and disadvantages of XRF spectrometers for large particle detection
- Using SEM-EDX for root cause failure analysis
- LaserNet; automating ferrographic analysis

### Fluid Properties Analysis

- Differentiating between oxidation and other base oil degradation pathways
- Troubleshooting additive depletion with some common and not-so-common oil analysis tools
- Using FTIR for advanced lubricant chemical analysis
- Determining oil life using RPVOT and remaining useful life tests
- Troubleshooting air release and foaming problems
- Identifying the addition of wrong oil using oil analysis

### Using Oil Analysis to Define Lubricant Standards

- Setting up a basic QA program for incoming lubricants
- Defining minimum performance standards for new lubricants using oil analysis

- Conducting lubricant cross-compatibility testing
- Using oil analysis viscometric properties to guide and troubleshoot lubricant selection
- Obtaining samples for in-service grease analysis
- Identifying possible grease compatibility issues using grease analysis
- Determining oxidation and the remaining useful life of a grease
- Troubleshooting wear problems in grease-lubricated bearings

### Oil Analysis Program Design

- Using RCM and FMECA analysis to guide analysis program design
- Designing an oil analysis program to ensure proactive and predictive maintenance success
- Integrating oil analysis with other condition-monitoring technologies
- Ensuring oil analysis quality on-site and off-site
- Selecting machine-specific oil analysis test slates
- Creating effective oil analysis procedures
- How to scope training for the rest of the oil analysis and lubrication team
- Tips for setting up an effective on-site lab

### Managing an Oil Analysis Program

- Selling oil analysis to management - how to write an effective oil analysis proposal
- Using financial data to justify lubrication and oil analysis program costs
- Using statistics to set level limits
- Modifying limits to account for operational changes
- Calculating and using rate-of-change limits
- How to set condition-based change limits
- Learning multi-parameter diagnostic techniques
- How to effectively manage oil analysis data
- Using oil analysis to develop lubrication Key Performance Indicators (KPIs)

### Interactive Workshop

- Individual and group participation in advanced problem-solving exercises, including designing and implementing an oil analysis program, analysing data and making decisions on continuous improvements.
- ICML MLA Level II flashcard review session.

## Testimonials from Past Participants in Noria's OIL ANALYSIS Seminars:

Great for troubleshooting future problems in systems.

*Estor Herfindahl  
Sales, Air Hydraulics Eng • AL*

Comprehensive course covering all aspects of lubrication health and lubrication problems, identification and correction/avoidance.

*David Richardson  
PM Tech, Allied Services/IVC • IA*

Unquestionably, the most informative seminar (of any topic) I've ever attended.

*Rick Conley  
Senior Analyst, Amergen Energy • NJ*

This class was a definite eye opener for myself on the importance of oil condition.

*Andy McKay  
Maintenance Engineer, American Crystal Sugar Co. • ND*

I feel that you present a lot of very valuable information that will help me make a big difference in our program.

*Al Nesbitt  
Mechanic, Asarco Inc. • AZ*

A must seminar for management. Very dynamic, case studies were excellent.

*Ivan Barrios  
Senior Chemist, Austin Energy • TX*

Very informative and helpful in everyday industrial maintenance.

*Steven M. Whetzel  
Sr. Engineer Technician, Dominion Generation • VA*

Practical and informative that showed the importance of oil analysis relative to PM integration and uptime improvement.

*Paul Brown  
Mech. Reliability Engr., E. I. DuPont • TX*

Lots of good info, extensive material covered but not cluttered or congested.

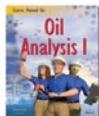
*Karl Jesson  
PDM Coordinator, Entergy • NY*



# What You Get When You Attend:

## Course Manual

When you leave the seminar, you'll consider this free course manual indispensable to your job. Each manual includes copies of seminar slides, worksheets and real-world case studies.



## Sample Frequency Generator

Noria's Exclusive Sample Frequency Generator is used in maintenance department around the world to schedule optimum sampling frequencies.



## Life Extension Table

Noria's Life Extension Table will show you how to achieve up to 10X machine life extension for hydraulic system component, diesel engines, rolling element bearings, journal bearings, turbo machinery and gearboxes.



## Visual Oil Inspection Comparator

The Visual Oil Inspection Comparator gives you a quick estimation of where the oil is in its life-cycle and when it might be time to change it.



## Best Practices for Oil Sampling CD-ROM

The Best Practices for Oil Sampling CD-ROM explains the ins and outs of proper oil sampling. It can be used for training or to generate ideas for your program.



## Sourcebook for Used Oil Elements

Use the information-packed Sourcebook for Used Oil Elements to lookup the sources of various elements in over a dozen different machine types.



## The Presenters

### Andrew Sitton, MLA I, MLA II

Andrew is one of S.E. Asia's leading Oil Analysis Instructors, with a wealth of experience in Oil Analysis in such countries as Indonesia, Singapore, Malaysia and Thailand. Andrew has established and managed Oil Analysis laboratories for such names as Optimal Systems Inc. and Core Laboratories Ltd. In addition to commercial Oil Analysis, he managed military S.O.A.P laboratories for the Iranian Department of Defense, both Air Force and Navy divisions.

### Juan Bautista L. Lee II, MLT I, MLA I, CMRP, CLS

Juan has a bachelor degree in Mechanical Engineering from the University of British Columbia and a master degree in Entrepreneurship from the Asian Institute of Management.

He is certified by ICML (International Council for Machinery Lubrication) as a Machinery Lubrication Technician Level 1, Machine Lubricant Analyst Level 1, by STLE (Society of Tribologists and Lubrication Engineers) as a Certified Lubrication Specialist, by SMRP (Society of Maintenance and Reliability Professionals) as a Certified Maintenance and Reliability Professional and has been an associate member of the ASME (American Society of Mechanical Engineers) for almost 10 years.

For more than 5 years, Juan has been working as a preventive maintenance consultant, providing training aimed at the needs of the customer. His field of expertise includes lubrication, contamination control, laser alignment, and conveyor maintenance.

## Get Answers to These and All Your Questions About Oil Analysis!

How often should I use oil analysis?

Where is the best place to get an oil sample?

What are the benefits and drawbacks of screening oil samples before sending them to my lab?

How clean should I keep my oil and what type of filter should I use?

What are all these numbers I see on my oil analysis report?

How do I know which oil analysis lab is right for me?

What steps can I take to ensure that I get a good sample each time?

How do I determine the remaining useful life of my oil?

How do I know if I should occasionally "sweeten" my oil with additives?

What is the best temperature for trending viscosity?

What are the secrets to catching bearing faults with wear debris analysis?

## Testimonials from Past Participants (continued):

A very good course to build on using PM/PDM technologies.

*Joe Martin*

*Preventive Maint Group Leader, Abbott Labs • IL*

Very informative, more than I expected to cover.

*Larry Philpott*

*Associate Chemist, ACS • TN*

I found the information presented very useful, it gave me a good background to build from, to move forward in oil analysis.

*Kimberly Chilcote*

*Lab Supervisor, AEP • OH*

These two days really helped to drive home the oil analysis information. The practical lessons in the end of day 4 were great. The information of financial justification will also be a help when trying to justify oil analysis programs.

*Kim Chilcote*

*Production Service Leader, AEP • OH*

Most informative and practical training relating back to the maintainability of our equipment.

*Matt Edwards*

*Maintenance Engineer, AET Films • IN*

Very eye-opening and organized and detailed. Excellent hands-on, practical learning. I feel like I can make an immediate impact in our business.

*Patrick Hardin*

*Project Engineer, Aggreko Inc. • LA*

Oil Analysis should be a major part of maintenance/apprentice training in any major manufacturing plant.

*Gordon A. MacDonald*

*Maintenance Crew Leader, Bowater • ON*

# Registration

**US\$ 1,669.00** (plus 12% VAT applicable to Philippine companies only)

Inclusive of buffet lunch and snacks for 5-day course, 400+ pages course manual, plus latest issues of Noria Corporation's information-filled quarterly publications

## 1. Please enroll me for the following course:

**October 22 - 26, 2007    Discovery Suites, Ortigas Center, Metro Manila**

## 2. Name of Attendees (please print):

	Attendee # 1	Attendee # 2	Attendee # 3
Salutation			
Name			
Title			
Department			
Phone / Ext.			
Mobile			
Email Address			

Company \_\_\_\_\_

Address \_\_\_\_\_

City / Province \_\_\_\_\_ Zip Code \_\_\_\_\_

Main Business / Activity \_\_\_\_\_

**APPROVING MANAGER:**

Name \_\_\_\_\_ Signature: \_\_\_\_\_

## 3. Conditions:

**Terms of Payment:** Following completion and return of the registration form, full payment is required within 5 days from receipt of invoice. PLEASE NOTE payment must be received prior to conference date. Receipt will be issued on payment. Due to limited conference space we advise early registration to avoid disappointment. A 50% cancellation fee will be charged under the terms outlined below. We reserve the right to refuse admission if payment is not received on time. Unless otherwise stated on booking form, payment must be made in US Dollar.

**Substitution & Cancellation:** Provided the total fee has been paid, substitutions are allowed at no extra charge if earlier than 14 days before event. Substitution within 14 days before event-date will be allowed subject to an admission fee equal to 10% of total fee. Otherwise all bookings carry a 50% cancellation liability immediately after signed sales contract has been received by KONTRAKTWERKE Inc. (as defined above). Cancellation must be received in writing by mail or fax six (6) weeks before the conference to be held in order to obtain a full credit for any future KONTRAKTWERKE Inc. conference. Thereafter, the full conference fee is payable and is non-refundable. The service charge is completely non-refundable and non-creditable. Payment terms are five (5) days and payment must be prior to the start of the conference. Non-payment or non-attendance does not constitute cancellation. By signing this contract, the client agrees that in case of dispute or cancellation of this contract that KONTRAKTWERKE Inc. will not be able to mitigate its losses for any less than 50% of the contract value. If, for any reason, KONTRAKTWERKE Inc. decides to cancel or postpone this conference, KONTRAKTWERKE Inc. is not responsible for covering airfare, hotel or other travel costs incurred by client. The conference fee will not be refunded, but can be credited to a future conference. Event programme content is subject to change without notice.

## On-Site Training



If you have ten(10) or more people attending, consider the benefits of an in-house session conducted in the privacy and convenience of your facilities or meeting site of your choice. We adapt each presentation to fit your industry, schedule and budget.

## ICML Certification Exam

On the day following the Oil Analysis training course, qualified applicants may attempt to become certified by the International Council for Machinery Lubrication (ICML) as a Level 1 Machine Lubricant



Analyst (MLA). MLA Certification is a peer-review evaluation of an individual's skills.

## Manner of Payment

Please deposit check payments to account name/ payee Kontraktwerke Inc." at Chinabank Acct. No. 134-040121-6

- one(1) week before seminar - for checks from Manila-based banks
- two(2) weeks prior to event - for checks on banks outside Manila.

For more info:

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Website: www.kwi-ph.com/cre



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