# Oil Analysis - level 1

**In accordance with ISO 18436-4 ,Category level 1**
**Fundamental of Machinery Lubrication and Oil Analysis**

# Oil Analysis - level 2

**In accordance with ISO 18436-4 , Category level 2**
**Previously name as " Oil  Analysis  I&II "**

NORIA    ISO International Organization for Standardization    ICML

## Oil Analysis –level 1

**หลักสูตรอบรม 4 วัน**

**หลักสูตร ปี 2555**

- 27-30 มีนาคม 2555
- 17-20 กรกฎาคม 2555
- 20-23 พฤศจิกายน 2555

*At* **Novotel Hotel, Bangna, Bangkok**

## Oil Analysis –level 2

**หลักสูตรอบรม 4 วัน**

**หลักสูตร ปี 2555**

- 22-25 พฤษภาคม 2555
- 18-21 กันยายน 2555

*At* **Novotel Hotel, Bangna, Bangkok**

**Language : Thai**
**บรรยายภาษาไทย**

**Course Fee :**
**Baht 22,800 .- /person +VAT 7%**

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# Oil Analysis – Level 1

## Course Outline

### Maintenance Strategies
- Why machine fail
- The impact of poor maintenance on company profits
- Role of effective lubrication in failure avoidance
- Fundamental aspects of reliability-Centered Maintenance (RCM)
- Aspects of Conditioned-Based Maintenance (CBM)

### Lubrication Theory
- Fundamental of tribology
- Functions of a lubricant
- Lubrication regimes
- Hydrodynamic
- Elasto –hydrodynamic
- Boundary

### Lubrication Fundamentals – Lube oil
- Base-oils
- Additive and their functions
- Oil lubricant physical ,chemical and performance properties and etc.

### Lubrication Fundamentals - Grease
- How grease is made
- Thickener types
- Grease physical ,chemical and performance properties and etc.
- NLGI classification

### Lubrication Fundamental – Classification
- Viscosity (ISO/SAE)
- Grease NLGI
- Base Oil type selection
- Engine (API/ILSAC)
- API Gear oil
- AGMA Gear
- Hydraulic fluids

### Solid Lubrication
- Type of Solid Lubrication
- Advantages and disadvantages of the common solid lubricants

### Lubricant Selection
- Viscosity selection
- Base oil type selection
- Additive system selection
- Machine specific lubricant requirement ; hydraulic systems, Rolling element bearing, Journal bearing, Reciprocating engines , Gearing and gearboxes
- Application and environment related adjustments

### Lubricant Application - Principle
- Effective use of manual delivery techniques
- Automatic delivery systems
- Distributed delivery systems
- Automated lubricators
- Maintenance of automated lubrication systems

### Lubricant Storage ,Handling and Management
- Lubricant receiving procedures
- Proper storage and inventory management
- Lubricant storage containers
- Proper storage of grease guns and other lube application devices
- Maintenance of automatic grease systems
- Health and safety assurance

### Oil Drains Flushing and Reservoir Management
- How to optimize and extend oil change interval
- Interval v.s. conditioned oil change intervals
- Best Practice for oil change
- How to know when to perform a flush

### Oil Analysis - Fundamental
- Listen to your oil
- What oil analysis can tell you
- The right oil analysis program
- Three categories of oil analysis

### Oil Sampling –level 1
- Objectives of lube oil sampling
- Sampling Method
- Managing interferences
- Bottle Cleanliness and management
- Flushing
- Machine condition appropriate for sampling

### Lubricant Heath Analysis and Monitoring-level1
- Lubricant failure mechanism
- Oxidative degradation
- Thermal degradation
- Additive depletion
- Fluid properties test method and measurement units

### Lubricant contamination and control-level 1
- Particle contamination
- Moisture /Water contamination
- Filtration and separation
- Filter rating
- Filtration systems

### Wear Debris Monitoring and Analysis –level 1
- Common machine wear mechanisms

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บรรยายภาษาไทย

# Oil Analysis – Level 2

## Course Outline

In accordance with ISO 18436-4-level 2

### Oil Analysis Maintenance Strategies
- Fundamental aspect of reliability-centered maintenance(RCM)
- Fundamental of condition based maintenance (CBM)
- Predictive maintenance strategies
- Proactive maintenance strategies

### Lubrication Fundamental
- Base Oil
- Additive functions
- Synthetic lubricants
- Lubrication Regimes  ;-
- Hydrodynamic
- Elasto-hydrodynamic
- Boundary

### Oil Sampling –level2
- Objectives for lube oil sampling
- How to find the best sampling location
- Using primary and secondary sample point
- Recommendation for sampling valve and hardware
- Oil sampling procedures
- Setting optimum oil sampling frequencies
- Sampling inaccessible equipment

### Lubricant health monitoring, diagnostics –level 2
- Lubricant failure mechanisms
- Oxidative degradation
- Thermal degradation
- Additive depletion /degradation
- Setting optimum limits for viscosity trending
- Diagnosing over-limit viscosity results
- Diagnosing under-limit viscosity results
- Using Acid and Base Numbers
- Common TAN trends for different oil types
- Using FTIR for detecting common problems
- When and how to use the RPVOT (RBOT) test

### Lubricant contamination measurement and control-level2
- Particle Contamination
- Moisture Contamination
- Glycol coolant contamination
- Soot contamination
- Fuel contamination
- Air contamination
- Setting target for oil cleanliness

### Wear Debris Analysis and monitoring-level 2
- Test for wear element analysis
- Technologies used to analyze wear debris
- Spark emission and ICP spectrometers
- Measuring large particles with Rotrode Filter
- Understanding wear metal trends
- Setting optimum limits for wear metals
- Using machine metallurgy for diagnosis
- Potential sources of metals in oil
- Elemental analysis vs. ferrography
- Using wear particle diagnosis templates
- Creating a patch filtergram

### Start & Design Oil Analysis Program
- Program implementation steps
- Basic for selecting an oil analysis lab
- Options to consider before getting started
- Goals for oil analysis
- Costs and benefits - what to expect

### How to Select Routine and Exception Test Based on Reliability Goals
- Selecting routine for diesel engines
- Selecting routine for turbo machinery
- Selecting routine for bearing, hydraulic, compressors
- Selecting  Exception Test
- A quick method for selecting sample frequencies

### How to Set Oil Analysis Target & Alarm Limits
- Four considerations when setting limits
- Proactive goal based limits
- Predictive rate-of-change limits
- Remaining useful life aging limits
- How to use statistical limits
- Calculating statistical rate-of-change limits
- Six common data interferences

### How To Read Oil Analysis Report / Data Interpretation
- Keys Requirement Before you can read report
- Understand Oil Analysis Trend
- Interpret data to:
  - detect the use of the wrong lubricant
  - detect dispersancy failure
  - detect antioxidant depletion
  - Identify failure due to lubrication starvation

### Field Inspection & Tests
- Simplify oil analysis using easy field tests
- Ten easy tests you can do without instruments
- Combining field test data with lab test data
- Partnering oil analysis with vibration analysis
- The use of oil analysis software
- The anatomy of an oil analysis report
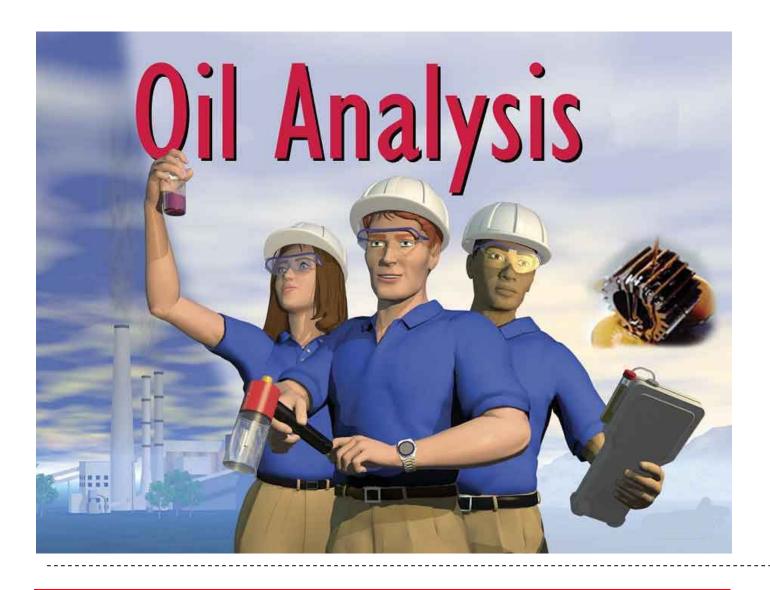- Case studies-try to figure out what's going on

### Workshop – Interactive Case Studies Workshop

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