Oil Analyzers INC.

OIL ANALYSIS SERVICES

www.motoroilinfo.com

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Maximize Productivity - Minimize Wear

Right now, the oil working in your crankcase, gearbox or sump contains information that could be vital to the performance and productivity of your engine or equipment. Contaminants that can indicate wear or cause serious equipment damage such as metals, water, raw fuel, acids, fuel soot and other solids collect in your lubricant. Using oil analysis to evaluate these contaminants is a scientific approach to predictive maintenance, allowing you a look inside your machinery to spot mechanical wear and contamination in its early stages. You'll extend machine life, head off major maintenance costs and prevent catastrophic failure that can shut you down or leave you stranded, and you'll maximize lubricant life.

Oil Analysis - A Proven Industry Standard Maintenance Tool

Used oil analysis has existed as long as lubricants have been around. In the 1940s, the railroad industry began to analyze their lubricants for the various metals found in specific components of the engine. By tracking wear rates and trends from one sample to the next, maintenance could be anticipated and scheduled before component failure resulted in downtime and the loss of equipment productivity. This data allowed railroads to schedule teardowns when they were necessary, rather than after an arbitrary number of operating hours. The advent of spectrometric metals analysis gave rise to the practice of "predictive maintenance" which continues to be more cost effective than the standard of preventive maintenance. The oil analysis process consists of (1) lubricant sampling, (2) laboratory analysis and (3) interpretation of the results to determine the condition of the fluid and the machinery from which the sample was taken.

Who is Using Oil Analysis?

An oil analysis program can provide critical information for any equipment requiring lubricants - both gasoline and diesel engines, transmissions, gears, bearings, and hydraulic systems. It's useful for owners of passenger cars, over-the-road fleets, off-highway equipment, boats, or high performance vehicles. It's also right for any industrial business that focuses on managing plant equipment and maintenance costs. As a matter of fact, as many as 70 percent of today's construction equipment operators use professional oil analysis to assess equipment and lubricant condition. Forty percent of all transportation fleets and 20 percent of industrial plants also rely on lube testing as an integral part of predic-

Oil Analysis Provides a Big Return for Your Small Investment by:

- Extending equipment life by preventing premature component failure
- Reducing maintenance costs by eliminating unnecessary component changes and decrease in downtime due to premature scheduled maintenance
- Enabling calculation of optimum drain intervals that will reduce lubricant costs and assure maximum equipment protection
- Eliminating complete teardowns based on guesswork
- Reducing unscheduled maintenance - keeps equipment up and running
- Enabling better assessment of equipment performance

Dup SnowPlow From
G-554 front cover: #43822

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tive/preventative maintenance. These businesses know that oil analysis replaces the guesswork in predicting equipment wear and scheduling optimum drain intervals. The data provided by oil analysis enables them to maximize equipment profitability by minimizing maintenance downtime.

The Oil Analysis Program from Oil Analyzers, Inc.

Make the decision to use Oil Analyzers, Inc. (OAI) to test the lubricants in your equipment or fleet and you'll be partnering with the most advanced computerized testing laboratory today's technology has to offer. Simply collect your samples using our sampling kits and mail them in our pre-addressed packages to our lab. Our technical team will do the rest. They combine their years of analytical experience with state-of-the-art instrumentation to produce reliable, meaningful results from your samples.

Testing is typically completed by the end of the business day following receipt of your sample. Results are reported by fax, mail, or in the case of an impending equipment failure, by telephone. Reports are easy-to-read and include interpretation and recommendations. And because the tests performed on your samples are tailored to your machinery, you'll get data that applies directly to your equipment and maintenance decisions.

Our technicians are available to answer your questions ranging from sampling procedures to the test results and maintenance recommendations. Also, your reports are kept on file at the lab to enable monitoring of trends and detection of subtle changes in the condition of your equipment.

Oil Analyzers INC.

2206 WINTER STREET • SUPERIOR, WISCONSIN 54880
TEL: 715-395-0222 • FAX: 715-392-7252

CUSTOMER INFORMATION

ACCOUNT NUMBER: _____

COMPANY: _____

STREET: _____

CITY: _____

STATE, ZIP: _____

CONTACT PERSON: _____

PHONE: _____

FAX: _____

UNIT INFORMATION

UNIT / CODE NO: _____

SERIAL NO: _____

COMPONENT: _____

ENGINE (size/type): _____ / _____

MAKE: _____

MODEL: _____

YEAR: _____

SAMPLE INFORMATION

OIL BRAND: _____

OIL TYPE: _____

SAE GRADE / ISO VISCOSITY: _____

DATE OIL INSTALLED: _____

DATE SAMPLE TAKEN: _____

HAVE WE TESTED THIS UNIT BEFORE? ☐ YES ☐ NO

MILES / HOURS (circle) ON SAMPLE: _____

MILES / HOURS (circle) ON UNIT: _____

QUANTITY OF OIL ADDED: _____

OIL CHANGED NOW? ☐ YES ☐ NO

TYPE OF FILTRATION: _____

LAST FILTER CHANGE: _____

SERVICE INFORMATION
(check one)

☐ Gasoline Engine	☐ Industrial-Circulation
☐ LPG Engine	☐ Diesel Engine
☐ Manual Transmission	☐ Natural Gas Engine
☐ Vehicle-Differential	☐ Automatic Transmission
☐ Industrial-Hydraulic	☐ Vehicle-Hydraulic
☐ Industrial-Gears	☐ Industrial-Gas Turbine
☐ Industrial-Steam Turbine	☐ Industrial-Bearing
☐ Industrial-Compressor	☐ Other (please specify below)

_____

_____

_____

RETURN FORM WITH SAMPLE

Oil Analyzers INC.

IMPORTANT – PLACE ON BOTTLE

How the Oil Analysis Program (OAP) Works

OAP is a 4-step process:

(1) Registration
(2) Sampling
(3) Analysis
(4) Diagnostic Reporting

Step 1 – Registration

1. Begin the OAP process by purchasing a sampling kit. Simply call Oil Analyzers Inc. at (715) 395-0222 for pricing information or to order kits (and a sample pump if desired). You may purchase kits singly or in quantities of 10, 25, 50 or 100, with lower per-kit prices for larger orders.
2. Upon receipt of your order, OAI will immediately send out your sample kit, which includes sample container, sample information form, mailer and complete sampling and mailing instructions.

Step 2 – Sampling

1. Read the Oil Sampling Procedures included in the kit.
2. Fill out the Sample Information Form completely.
3. Take a sample (minimum: 2 to 3 oz) using the convenient instructions included in your kit. See page 7 of this brochure for more information on sampling.
4. Close and seal sample container **tightly**.
5. Using the mailing instructions included in your kit, send the filled sample container and the Sample Information Form to OAI in the supplied mailer.

Step 3 – Analysis

Upon receipt of your sample at the Oil Analyzers Inc. laboratory, all requisite testing will be performed. All analyses include determination of viscosity, fuel dilution (if applicable), water, dirt content, fuel soot contamination (if applicable), plus spectrochemical analysis for 21 trace elements to determine component wear, airborne dirt, anti-freeze contamination (if applicable), and oil additive concentrations.

The analyses also include a neutralization value determination - Total Base Number, TBN (primarily for gasoline and diesel motor oils) or Total Acid Number, TAN (non-crankcase lubricants). Oxidation values and nitration values (if applicable) are also determined.

Step 4 – Reporting

1. OAI will mail your analysis report on the business day following receipt and testing of your sample. For even faster results, simply request on the Sample Information Form that your report be faxed to you. Be sure to include your fax number.
2. If your analysis uncovers a critical problem, such as pending equipment failure, a technician will telephone you directly to advise you of the situation and recommend a course of corrective action.

The Sampling Process

Trend Analysis

A single sampling analysis is useful in providing information when critical failure conditions exist. However, trend analysis is a better tool for estimating the useful life or overall condition of your engine or equipment. Trend analysis samples are taken and analyzed at regularly scheduled intervals. Comparing the most recent analysis to previous reports on a given machine shows the development of trends. Monitoring these trends enables early detection of internal abnormalities. Tested values falling within acceptable limits may show a pattern of subtle variance, which could signal a developing problem.

Machines of the same type will accumulate contaminants and wear at different rates. Performing trend analysis on each machine is the most effective method of giving you an internal look at your equipment and enabling you to deal with developing problems before they become catastrophic situations.

Sampling Frequency

The frequency of sample analysis from your equipment depends on the machine type, machine application and condition, operating environment and other variables. For example, many machines that operate in harsh environments, such as heavy equipment in mining or construction, require short oil sampling intervals - every 100 to 300 operating hours. However, certain power transmission systems, such as gearboxes and hydraulic systems used inside manufacturing and production facilities, require no more than quarterly sampling intervals. The following table lists generic sampling frequencies for common equipment types, and is provided as a guideline only. Additional information is available from Oil Analyzers Inc., your lubricant supplier, and the equipment manufacturer.

Collecting a clean and representative oil sample is critical to the oil analysis process. Put simply, an oil analysis is only as good as the sample taken. The accuracy and reliability of the data produced by an analysis hinges on receiving a representative sample from the equipment to be tested. To assure that the sample extracted is representative of the system, always follow proper sampling procedures.

EQUIPMENT TYPE	TEST PACKAGE	RECOMMENDED SAMPLING FREQUENCY	
Motor Vehicles			
Diesel engines	Basic with TBN	100 - 500 hours, 3500 - 20,000 miles	
Gasoline engines	Basic with TBN	50 - 200 hours, 2000 - 7500 miles	
Transmissions	Basic with TAN	30,000 - 100,000 miles	
Gears, differentials, final drives	Basic with TAN	30,000 - 100,000 miles	
Industrial		Normal Use	Intermittent Use
Hydraulics	Basic with TAN	750 hours or monthly	Quarterly
Gas turbines	Basic with TAN	750 hours or monthly	Quarterly
Steam turbines	Basic with TAN	1500 hours or bimonthly	Quarterly
Air or gas compressors	Basic with TAN	750 hours or monthly	Quarterly
Refrigeration compressors	Basic with TAN	Quarterly	—
Natural gas engines	Basic with TAN	750 hours or monthly	—
Gears and bearings (industrial)	Basic with TAN	1500 hours or bimonthly	Quarterly

Sampling Methods

1. The component sampled should be brought to operating temperature prior to sampling. This will assure that the insoluble and semi-soluble material is suspended evenly throughout the system. Samples taken from components that have been inactive for long periods are not representative.
2. Sample should always be taken in the same manner and from the same point.
3. Do not sample a component directly after an oil change or after a large amount of makeup oil has been added.
4. Use a clean, dry, unbreakable container. Never reuse containers or sampling tubing.

Collect your sample using one of the three following methods:

1. **Sample Pump Method**

   Request a sample pump when ordering your sample kit.

   The pump will come with complete instructions and will enable you to draw a sample quickly and easily. Seal the bottle tightly.

2. **Sample Valve/Petcock Method**

   The valve should be wiped clean and any stagnant oil should be drained prior to catching a sample run. Seal the bottle tightly. Wipe bottle clean.

3. **Oil Drain Method**

   Clean the area around the drain plug thoroughly to avoid sample contamination. Allow oil to drain for three to five seconds prior to catching a sample. Place a clean, dry sample bottle in the oil stream and fill to within ½ inch of the top. Seal bottle tightly. Wipe bottle clean.

Sampling Tips

- For best results, oil samples should be taken immediately after equipment shutdown, while the equipment is still at operating temperature. Never sample a cold engine and always make sure the oil has been well circulated before taking a sample. Dirt, water and other debris tend to settle to the bottom of the reservoir while light fuels tend to float. This separation will compromise your analysis.
- Good locations for sampling include an oil gallery, the engine crankcase, the drain plug or dipstick tube and the equipment reservoir or sump.
- When taking oil from industrial machinery through a bottom drain, be careful to draw oil until your sample has a uniform, representative appearance.
- Use samples from the drain pan or oil filter only as a last resort. For a failed engine that has had the oil drained, a drain pan or oil filter sample may help detect the cause of the failure.
- Avoid prolonged skin contact with used oil. Wash exposed skin with soap and water after exposure.

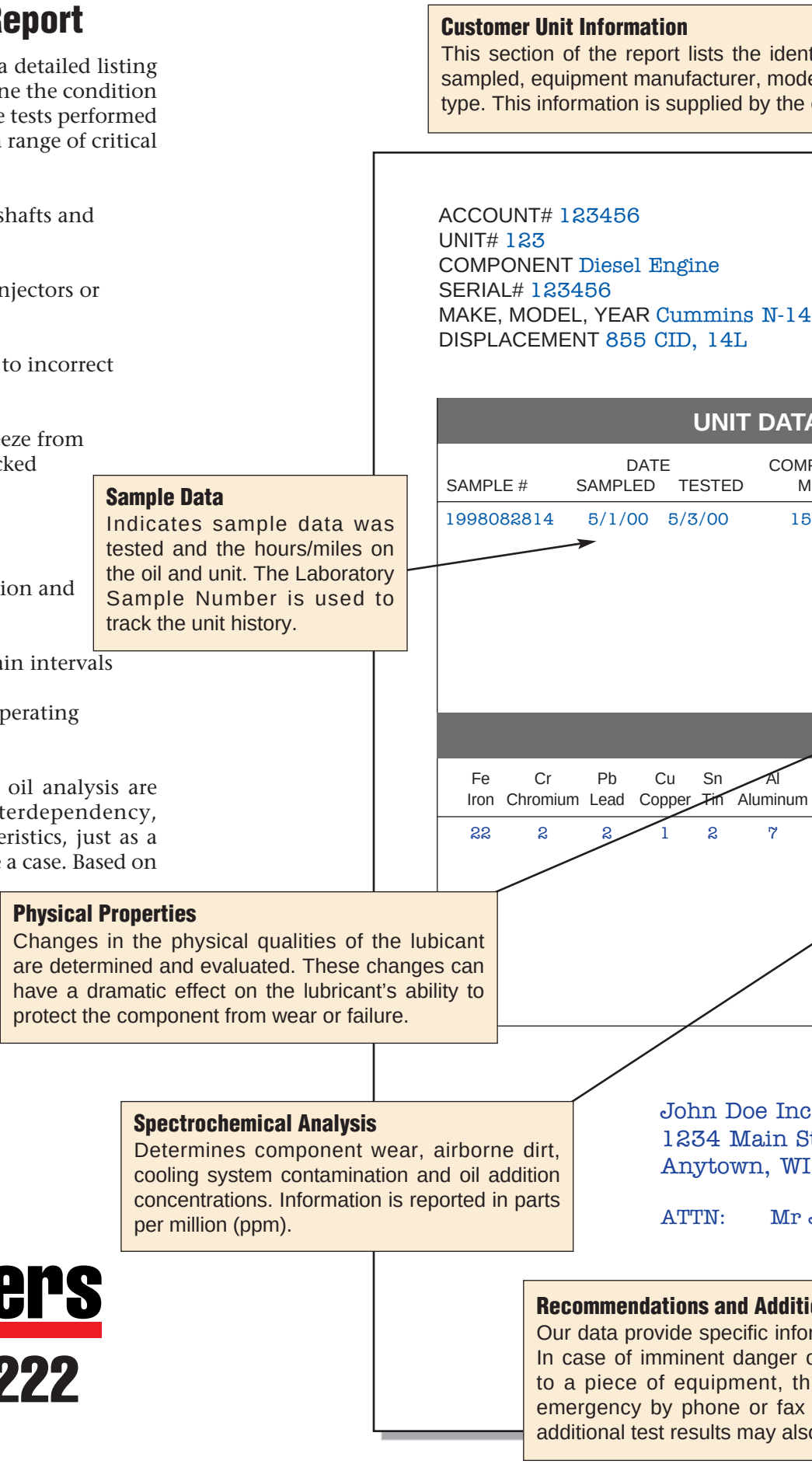
Caution: Engine crankcase oil temperatures can exceed 200°F. To avoid personal injury, use protective equipment such as gloves, safety glasses and protective clothing.

Reading Your Analysis Report

Your OAI oil analysis report contains a detailed listing of the characteristics tested to determine the condition of both the equipment and the oil. The tests performed in the analysis are designed to detect a range of critical situations including:

- Abnormal wear in engines, gears, shafts and bearings
- Oil thinned by fuel from leaking injectors or crossover lines or cool operation
- Poor equipment performance due to incorrect air-to-fuel ratios
- Oil contaminated by water/antifreeze from cracked gaskets, failed seals or cracked cylinder heads
- Incorrect grade of lubricant in use
- Air filter failure causing dirt ingestion and excessive wear
- Overextended or underutilized drain intervals
- Lubricant contamination due to operating environment

Most of the characteristics of a used oil analysis are interdependent. Because of this interdependency, trained analysts examine the characteristics, just as a detective would examine clues to solve a case. Based on the examination, a recommendation is made by OAI as to the condition of both the equipment and the oil. The sample report shown here details the characteristics tested, as well as the causes and effects associated with each characteristic.



tification of the unit
el and oil brand and
customer.

Oil Degradation
Total Base Number (TBN) measures the alkaline reserve remaining in crankcase lubricants to neutralize acidic by-products of combustion. For non-crankcase lubricants, the measurement of Total Acid Number (TAN) provides a good indication of a lubricant's condition.

OIL BRAND AMSOIL HDD
VIS. GRADE 5W-30
SUMP CAPACITY 40 Qts
MAKE UP OIL AMSOIL HDD
ESP3 TYPE OF FILTER SDF 74
LAST FILTER CHANGE 134626

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A			PHYSICAL PROPERTIES						OIL DEGRADATION				
PONENT ILES	OIL MILES	OIL CHNG.	GLY COL	% WATER	% FUEL	VISCOSITY 40°C	VISCOSITY 100°C	% SOLIDS	SOOT	% OXD	% NOX	TBN	TAN
4626	26040	NO	NEG	<0.05	<1.0		11.08		1.7	7.8	11.4	7.3	

SPECTROGRAPHIC ANALYSIS (PPM*) *VALUES IN PARTS PER MILLION

Ni Nickel	Ag Silver	Mn Manganese	Si Silicon	B Boron	Na Sodium	Mg Magnesium	Ca Calcium	Ba Barium	P Phosphorus	Zn Zinc	Mo Molybdenum	Ti Titanium	V Vanadium	Cd Cadmium
0	0	1	7	51	0	398	3394	0	1128	1486	0	0	0	0

orporated
treet
54880

John Doe

RECOMMENDATIONS - ADDITIONAL

1998082814 RESULTS OF TESTS PERFORMED INDICATE
NO CORRECTIVE ACTION REQUIRED.
OIL IS SUITABLE FOR CONTINUED SERVICE.
RESAMPLE AT NEXT REGULAR INTERVAL.

onal Test Results
rmation about your equipment.
or pending catastrophic failure
e customer is alerted to the
when available. Reporting of
o be detailed in this area.

* COMPONENT IDENTIFICATION MUST BE GIVEN TO GENERATE HISTORY.
SEE REVERSE FOR EXPLANATION OF TERMS

Analysis Information

Test	Measures	Cause		Effect	
Viscosity (lubricant "thickness"; resistance to flow)	High Viscosity	Contamination Soot/Solids Oxidation Degradation Coolant Leak	Over-Extended Oil Drain High Operating Temperatures Improper Oil Grade	Increased Operating Costs Engine Overheating Restricted Oil Flow Increased Energy Consumption	Accelerated Wear Harmful Deposits/Sludge Hard Starting
	Low Viscosity	Additive Shear Fuel Dilution	Improper Oil Grade Coolant Leak	Engine Overheating Poor Lubrication	Metal to Metal Contact Accelerated Wear
Water/Coolant Contamination (water or coolant present in lubricant)	Oil Contamination	Defective Seals New Oil Contamination Coolant Leak Improper Storage Condensation	Cracked Head or Block Weather/Moisture Combustion By-Product Oil Cooler Leak	Engine Failure Lubricant Thickening Poor Lubrication Corrosion Sludge Formation	Increased Engine Heat Acid Formation Accelerated Wear Reduced Additive Effectiveness
Fuel Dilution (fuel present in lubricant)	Oil Contamination	Incorrect Air to Fuel Ratio Extended Idling Stop and Go Driving Incorrect Timing	Defective Injectors Leaking Fuel Pump/Lines Incomplete Combustion Carburetor Malfunction	Metal to Metal Contact Poor Lubrication - Oil Thinning Increased Overall Wear Cylinder Ring Wear Reduced MPG	Decreased Oil Pressure Reduced Engine Performance High Operating Costs Shortened Engine Life
Fuel Soot (soot content of lubricant)	Oil Contamination	Improper Air/Fuel Ratio Improper Injector Adjustment Defective Injector Poor Quality Fuel Incomplete Combustion	Clogged Air Induction Improper Equipment Operation Low Compression Worn Engine Parts/Rings	Poor Engine Performance Poor Fuel Economy Increased Operating Cost Harmful Deposits/Sludge Increased Wear Lubricant Thickening	Shortened Oil Life Lacquer Formation Carbon Deposits Clogged Filters Shortened Engine Life
Oxidation (evidence of lubricant breakdown)	Oil Contamination/Condition	Overheating Over-Extended Oil Drain Improper Oil Type	Combustion By-Products Blow-By Coolant Leak	Shortened Equipment Life Lacquer Deposits Oil Filter Plugging Increased Oil Viscosity	Corrosion of Metal Parts Increased Operating Expenses Increased Wear Shortened Equipment Life
Nitration (evidence of lubricant breakdown)	Oil Contamination/Condition	Abnormally High Combustion Temperature	Lean Air to Fuel Ratio Abnormal Blow-By Injector or Carburetor Malfunction EGR Valve Failure	Accelerated Oxidation Increased Exhaust Emissions Acidic By-Products Formed Increased Cylinder and Valve Train Wear	Oil Thickening Combustion Area Deposits Increased TAN
Total Acid Number (TAN) (lubricant acid content)	Oil Contamination/Condition	High Sulfur Fuel Overheating Excessive Blow-By	Over-Extended Oil Drains Improper Oil Type	Corrosion of Metallic Components Increases Oxidation Oil Degradation	Oil Thickening Additive Depletion
Total Base Number (TBN) (lubricant alkalinity reserve)	Lubricant Service Life (Low Readings)	High Sulfur Fuel Overheating Over-Extended Oil Drains	Improper Oil Type Acid Build-up in Oil	Increased TAN Oil Degradation	Increased Wear Corrosion of Metal Parts
Wear Metal Analysis (measures the levels of 21 metals from wear particles, contaminants and additives. This analysis detects dissolved metal ions plus particles less than 10 microns in size. See pages 11-13 for specific applications.)					

Wear Metal Analysis

Wear metal analysis, also called elemental analysis or spectrochemical analysis, is critical to the determination of component wear, airborne dirt, antifreeze contamination (if applicable), and oil additive concentrations. The following tables provide information on types of equipment and their elemental makeup. Due to the large variance in equipment "typical" values and condemnation limits, the equipment manufacturer should be consulted to provide specific information.

WEAR METAL REFERENCE GUIDE — Engine

When trace metals are detected, the following components could be responsible	Iron Fe	Copper Cu	Lead Pb	Aluminum Al	Silicon Si	Chromium Cr	Tin Sn	Sodium Na	Potassium K
Journal Bearings		X	X	X			X		
Bushings		X	X	X			X		
Cam Shaft	X								
Coolant Additives					X	X		X	X
Crankshaft	X								
Cylinder Walls	X					X			
Exhaust Valve	X					X			
Anti-Friction Bearing	X								
Gasket Materials		X			X				
Gasoline Additive			X					X	
Housing/Castings	X			X	X				
Ingested Dirt					X			X	
Oil Additive		X			X			X	
Oil Cooler		X							
Oil Pump Bushing		X	X	X			X		
Oil Pumps	X			X					
Pistons	X			X			X		
Rings	X					X			
Thrust Washers		X	X	X			X		
Timing Gears	X								
Turbo-Charger/Super Charger	X			X					
Valve Guides	X	X							
Valve Train	X								
Wrist Pin-Bushings		X	X	X			X		
Wrist Pins	X								

WEAR METAL REFERENCE GUIDE — Manual Transmission

When trace metals are detected, the following components could be responsible	Iron Fe	Copper Cu	Lead Pb	Aluminum Al	Silicon Si	Chromium Cr	Tin Sn	Sodium Na	Potassium K
Bushings		X	X	X			X		
Clutch Faces	X	X							
Coolant Additives					X	X		X	X
Anti-Friction Bearings	X								
Gears	X								
Ingested Dirt					X				
Oil Additives					X				
Oil Cooler		X		X					
Pumps	X			X					
Thrust Washers		X	X				X		
Gasket Materials or Silicon Sealant		X			X				
Housing/Castings	X			X	X				

WEAR METAL REFERENCE GUIDE — Automatic Transmisssion

When trace metals are detected, the following components could be responsible	Iron Fe	Copper Cu	Lead Pb	Aluminum Al	Silicon Si	Chromium Cr	Tin Sn	Sodium Na	Potassium K
Journal Bearings	X	X	X	X			X		
Bushings		X	X				X		
Coolant Additives					X			X	X
Anti-Friction Bearings	X								
Gasket Materials and Silicone Sealant					X	X			
Gears	X	X							
Ingested Dirt					X				
Shafts	X								
Thrust Washers		X	X				X		
Valves	X								
Housing/Castings	X			X	X				

WEAR METAL REFERENCE GUIDE — Differential Drive

When trace metals are detected, the following components could be responsible	Iron Fe	Copper Cu	Lead Pb	Aluminum Al	Silicon Si	Chromium Cr	Tin Sn	Sodium Na	Potassium K
Journal Bearings		X	X	X			X		
Bushings		X	X				X		
Anti-Friction Bearings	X								
Gears	X								
Ingested Dirt					X				
Oil Additives					X				
Oil Pump		X		X					
Road Salt								X	
Shafts	X								
Thrust Washers		X		X			X		
Gasket Materials and Silicon Sealant		X			X				
Housing/Castings	X			X	X				

WEAR METAL REFERENCE GUIDE — Industrial Gears

When trace metals are detected, the following components could be responsible	Iron Fe	Copper Cu	Lead Pb	Aluminum Al	Silicon Si	Chromium Cr	Tin Sn	Sodium Na	Potassium K
Journal Bearings		X	X				X		
Bushings		X	X				X		
Anti-Friction Bearings	X								
Gasket Materials or Silicone Sealants		X					X		
Gears	X	X							
Ingested Dirt					X				
Oil Additives					X				
Pumps	X	X		X					
Shafts	X								
Thrust Washers		X		X					
Housing/Castings	X			X	X				

WEAR METAL REFERENCE GUIDE — Hydraulics

When trace metals are detected, the following components could be responsible	Iron Fe	Copper Cu	Lead Pb	Aluminum Al	Silicon Si	Chromium Cr	Tin Sn	Sodium Na	Potassium K
Journal Bearings		X	X	X			X		
Bore & Rods	X					X			
Bushings		X	X	X			X		
Cylinders	X			X					
Anti-Friction Bearings	X								
Gasket Materials or Silicone Sealant		X			X				
Gears	X								
Guides		X							
Ingested Dirt					X			X	
Motors	X			X					
Oil Additives		X			X				
Oil Cooler		X		X					
Pistons	X	X							
Pumps	X			X					
Rods	X					X			
Spools	X	X				X			
Thrust Plates		X							
Valves	X								
Vanes	X								
Housing/Castings	X			X	X				

WEAR METAL REFERENCE GUIDE — Air Compressor

When trace metals are detected, the following components could be responsible	Iron Fe	Copper Cu	Lead Pb	Aluminum Al	Silicon Si	Chromium Cr	Tin Sn	Sodium Na	Potassium K
Journal Bearings		X	X	X			X		
Bushings		X	X				X		
Coolant Additives					X	X		X	X
Crankshaft	X								
Cylinder	X								
Anti-Friction Bearings	X								
Ingested Dirt					X				
Oil Additives		X			X			X	
Oil Cooler		X		X					
Oil Pump	X			X					
Pistons				X					
Rings	X					X			
Rotors	X								
Screws	X			X					
Shaft	X								
Thrust Washers		X	X				X		
Wear Plates	X	X	X				X		
Housing/Castings	X			X	X				
Gasket/Sealants		X			X				

Special Tests Available

Tests	Lube Tested	Method	Qty Req'd
Cloud Point	Diesel Fuel	ASTM D 2500	2 oz
Cold Cranking Simulator	Engine Oil	ASTM D 5293	1 oz
Color Test	Any	ASTM D 1500	2 oz
Cone Penetration of Lubricating Grease	Grease	ASTM D 217	1 lb
Corrosion, Copper Strip	Any	ASTM D 130	2 oz
Density	Any	ASTM D 1298	1 qt
Falex Pin & V-Block Test; per run	Gear Lube	ASTM D 3233	4 oz
Flash and Fire Point - (COC) Cleveland Open Cup	Any	ASTM D 92	3 oz
Flash Point - (PMCC) Pensky-Marten Closed Cup	Any	ASTM D 93	3 oz
Foam Stability Sequences I, II & III	Any	ASTM D 892	1 qt
*Fuel Dilution, %	Engine Oil	FTIR	1 oz
*Fuel Soot, %	Engine Oil	FTIR	1 oz
Four-Ball Wear Characteristics	Any	ASTM D 4172	4 oz
*FTIR Infrared Analysis	Any	FTIR-Scan	1 oz
Glycol Base Anti-Freeze Determination in Oils	Engine Oil	ASTM D 2982	1 oz
*Metals Analysis	Any	ICP	1 oz
**Neutralization Number - Total Acid Number	Any	ASTM D 664	1 oz
**Neutralization Number - Total Base Number	Any	ASTM D 2896	1 oz
*Nitration, %	Engine Oil	FTIR	1 oz
NOACK Volatility, % Weight Loss	Engine Oil	DIN 51581	4 oz
*Oxidation, %	Any	FTIR	1 oz
pH Range	Any		1 oz
Pour Point	Any	ASTM D 97	4 oz
Refractive Index	Any		1 oz
*Viscosity, measured in cSt, specify temperature	Any	ASTM D 445	2 oz
Viscosity Index (Includes 100°C & 40°C Viscosities)	Any	ASTM D 2270	4 oz
Water by Distillation	Any	ASTM D 95	2 oz
Water by Mobil Crackle Test	Any	MOBIL	2 oz
Water by Karl Fisher	Any	ASTM D 1123	1 oz
Water Separability - Petroleum Oils and Syn. Fluids	Any	ASTM D 1401	4 oz

*Also included in standard test package.
**TAN *or* TBN included in standard test package.
Other special tests available upon request.

Oil Analyzers INC.

1-715-395-0222

Notes

Oil Analyzers INC.

1-715-395-0222

Oil Analyzers Inc. has been a great asset to our business. Many of our accounts have semi-trucks running nonstop, which demands fast, accurate oil analysis. Oil Analyzers Inc. gives us just that. The results of the tests are not only supplied to us quickly, but the results are the most complete of any oil analysis company that we've dealt with. Oil Analyzers Inc. test results include TBN and NOx, tests other companies charge extra to run.
We also serve race car drivers who need fast, accurate analysis. Again, Oil Analyzers Inc. delivers.

—Mark Pusen, Superior Performance Enterprises, Monroe, Georgia

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Oil Analyzers Inc. professional oil analysis services may be purchased by calling Oil Analyzers Inc. at (715) 395-0222.

Oil Analyzers INC.

Amsoil Dealer: John Cardell
Phone Orders: 800-777-7094; Very Important! Give operator customer number: 1254295
Online Orders: www.buymotoroilonline.com
email: john@motoroilinfo.com
www.motoroilinfo.com