ENI LUBRICANTS TECHNICAL SUPPORT

Eni’s technical support team, located in Shanghai, assists customers to find the best lubrication solution for their business and resolve quickly any enquiries. We can provide both on-site service and consultancy to our customers.

Our technical team benefits from the network of eni technical teams worldwide. Strong support from eni R&D center in Milan, where eni engineer and scientists develop the lubricants of tomorrow, allow us to provide solutions to any lubrication application.

ENI LUBRICANTS USED OIL ANALYSIS

In order to better serve eni customers, Eni in China launches its lubricants testing services in 2016. The test services cover industrial oil and automotive engine oil.

Regular testing of the equipment lubricants not only helps you understand the status of the oil, it also better reflects the operation status of equipment, while helping to prevent equipment failures and reduce the shutdown rate. For manufacturers, it is possible to improve production efficiency and reduce equipment maintenance expenses. For fleet owners, it is possible to understand the operation of the vehicles, to help owner extending the engine life and reducing maintenance costs.
We can perform oil analysis for the following lubes:

**Industrial Gear Oils**

Industrial gear oils are used for lubrication of gear equipment and worm gear transmission parts of various machineries. Lubricating oils always work under severe conditions e.g. high temperature, high operation load, full of dust and in contact with water. In order to ensure the gear devices in good conditions, oil samples need to be taken out of lubrication systems for analysis regularly. In addition to conventional kinematic viscosity test, eni also pick up element analysis, PQ-test, water content and TAN-test for our standard test package for industrial gear oils.

**Industrial Hydraulic Oils**

The quality of industrial hydraulic oils has direct influence on the flexibility, accuracy and reliability of hydraulic systems. With the development of hydraulic technology (higher power; small oil tank capacity; higher pressure), higher performance requirements are raised on hydraulic oils. Hydraulic systems are equipped with servo-valves, which also brings a higher requirement on the cleanliness of industrial hydraulic oils. TAN test and element analysis provide the information about the oxidation status of hydraulic oils and wear status of the hydraulic systems.

**Turbine Oils**

Turbine oils are mainly used for the lubrication of steam turbines/gas turbines/water turbines in power plants, also for the lubrication of turbines on large-and-middle-sized vessels and other industrial steam turbines. Due to long-term exposure to the steam and gas with high temperature, special attention has to be paid to the oxidation of turbine oils. Therefore, we choose to perform TAN and RPVOT in our test package to monitor the oxidation status of turbine oils. With these tests, our customers can have a better understanding to the health condition of turbine oils.

**Compressor Oils**

Compressor oils are used for the lubrication of the machineries transporting gas and raising the gas pressure. Compressors are widely used and own various types. While lubricating every moving part of compressors, compressor oils are exposed directly to compressed gases with high temperature and high pressure. Therefore, the oxidation status (TAN test) and contaminations (water content) should also be monitored, in addition to those conventional test items.

**Natural Gas Engine Oils**

The high combustion temperature and calorific value of natural gas leads easily to excessively high temperature in combustion chambers, causing oxidation and nitration of engine oils. Besides, high sulfur content of natural gas produces acid substances due to high temperature and oxidation, resulting in the corrosion and wear of engine parts. Therefore, the sulfur content of nature gas engine oils and other wear elements should be monitored. Meanwhile, external contaminations (e.g. water) and the change of oxidation/nitration levels should be also carefully watched.

**Automotive Engine Oils**

If engine is the “heart” of a car, then the lubricating oil must be its “blood”. For the owners of the vehicles, too frequent changes of engine oil is a waste. Extension of oil change interval blindly may also cause immeasurable damages to engines. Besides the reference of OEM recommended oil change interval in vehicle manuals, people can determine a reasonable oil change interval by regular engine oil analysis (especially for truck and bus fleets). Engine oil analysis can also help to find out root causes of engine failures, e.g. engine parts with excessive wear or engine was overheated. Oxidation/Nitration levels contribute to a better understanding of oxidation status of engine oils. Water and fuel contamination can be monitored by water content test and flash point test.
## TEST PACKAGES

<table>
<thead>
<tr>
<th>TEST ITEMS</th>
<th>TEST METHOD</th>
<th>HYDRAULIC OIL</th>
<th>INDUSTRIAL GEAR OIL</th>
<th>TURBINE OIL</th>
<th>COMPRESSOR OIL</th>
<th>NG ENGINE</th>
<th>AUTOMOTIVE ENGINE OIL</th>
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</thead>
<tbody>
<tr>
<td>APPEARANCE</td>
<td></td>
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TEST INTERPRETATION
**APPEARANCE**

The appearance test used to simply evaluate the lubricant determination and the turbidity, etc.

**WATER**

Water is one of the most common contaminations, which leads to deterioration of lubricants, corrosion and wear of equipment. Trace of moisture in oil is usually measured by Karl-Fischer method. Water in lubricating oils is able to destroy the lubricant film and weaken the lubricity capability. Water can also accelerate the corrosion of metal parts and even causes the failure of additives due to their hydrolysis. The hydrolysis of additives will cause sediments in the oil, block of lubrication system and obstruct the circulation and supply of lubricating oils.

**KIN. VISCOSITY AT 40°C AND 100°C**

Kin. Viscosity is a parameter to illustrate the fluidity of lubricants. The higher the kin. viscosity is, the thicker the oil film is, the higher the adhesive force to metal surface is, the poorer the fluidity of the lubricating oil is. If the viscosity of lubricating oil is too high, it will cause the overheat of industrial equipment and poor fuel economy of automotive engines. If the viscosity of lubricants is too low, it will lead to excessive wear of industrial machineries and burning of engine oil for vehicles, etc.

**VISCOITY INDEX**

Lubricant viscosity changes with the temperature. If temperature rises, then the viscosity drops; if temperature drops, then the viscosity rises. This nature of lubricating oils is called as viscosity-temperature property. Viscosity index is a value to evaluate the viscosity-temperature property of lubricants. A high viscosity index means the viscosity changes very little with the change of temperature. In other words, the viscosity-temperature property of the lubricant is good.

**ELEMENT ANALYSIS (ADDITIVES/WEAR ELEMENTS/CONTAMINATIONS)**

As the most fundamental test used in oil analysis today, element analysis can detect between 15 and 25 different elements that are related to wear elements, contaminant metals and oil additives. It provides important information about the wear status of equipment, additive failures and contamination of lubricating oils.

Typical additive elements: Zn, P, Ca, Mg

Typical wear elements: Fe, Cr, Mo, Al, Cu, Pb, Sn

Typical contaminant elements: Na, B, K, Si

**TOTAL ACID NUMBER (TAN)**

Total acid number indicates the total amount of the acid substances in lubricating oils. These acid substances have corrosive effect on the equipment. Especially when there is water in the environment, the corrosive effect becomes even stronger. In addition, oxidation and deterioration of lubricating oils occurs during the storage and usage of lubricants, which results in the increase of total acid number. Therefore, the change of total acid number is always used to evaluate the anti-oxidation property of lubricants. When the total acid number reaches maximum limit, the lubricating oils have to be changed immediately.

**TOTAL BASE NUMBER (TBN)**

Total base number (TBN) represents the amount of detergent-dispersant additives in engine oils, therefore it is an important parameter to evaluate engine oils.
PARTICLE AMOUNT (CLEANLINESS)
The wear of equipment and failure of hydraulic systems mainly result from the sludge, dust, wear particles and other particles. The filters in hydraulic systems are easily blocked by particles. The particles can also cause excessive wear when the particles go between two moving parts.

ANTI-FOAMING TEST
Anti-foaming test is used to evaluate the foaming property of lubricants. In the actual application of lubricants, air goes easily into lubricants under the effects of shaking and stirring and forms foams. Besides, lubricants tend to be influenced by the active substances (e.g. detergent, EP additives and corrosion inhibitors) in additive packages. These additives increase the foaming tendency of lubricants.

PQ-INDEX
The iron content can be determined with ICP spectrometry (element analysis), but this is only suitable for particles smaller than 3µm. By contrast, the PQ index refers to the total amount of magnetisable iron in the sample. Especially for oils from diesel engines and hydraulic systems, it provides useful information on abnormal and mostly acute wear processes.

OXIDATION/NITRATION
Oxidation and nitration of lubricants are defined as naturally occurring chemical processes when oil is exposed to heat, oxygen and nitrogen oxides (NOx). They result in an increase of viscosity, sludge build up and higher total acid number of lubricating oils and reduce oil drain intervals. The oxidation/nitration status of lubricating oils can be determined by IR spectrum analysis.

COOLANT CONTAMINATION
When an engine oil is contaminated with coolant, the engines are exposed to a powerful and poisonous mixture of chemicals with the potential to cause massive failure of machine components in little time. When glycol- the main chemical component of antifreeze/coolant-is present in the oil, it oxidizes to form organic acid that can pit bearings, promote rust on steel and iron surfaces and corrode bronze or brass. The acids and water will also impair the oil’s dispersancy, allowing sludge and insolubles to form. The existence of coolant in engine oils can be detected by IR-spectrum or some special chemical test kits.

IR SPECTRUM
IR spectrum can fully test the changes occurring in the used oils. It can effectively analyze the quality condition of used oil and instruct the customers to change oils according to actual oil conditions, to ensure reliable lubrication of equipment. It can also help to evaluate the wear status of equipment and find out the root causes of equipment failure. The customers can carry out predictive maintenance with the help of IR spectrum analysis, to ensure the safe operation of equipment.