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Filtration Analysis Services Technology Ltd

How clean is your oil ?

Grease Analysis Service

How Clean is your Oil?

ISO 9001 ISOQAR REGISTERED

UKAS MANAGEMENT SYSTEMS 0026

Certificate Number 22484

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FA-ST Grease Analysis Service

To have your Greases analysed by FA-ST then all you need is one of our PRE-PAID Greases sampling & analysis kits. This kit comes with everything needed to extract samples and sent them in to our independent ISO accredited laboratory. Once received the at the lab we will e-mail a PDF report 2-3 days after receipt of the sample. The report will have details on critical factors such as Wear levels, Contamination and Chemical make-up of the oil and our laboratory technicians' comments and recommended actions if required.

GKIT1 – Grease Sampling & Analysis Kit

Why Have Greases Analysed?
Grease analysis is a vital part of a predictive maintenance strategy. Approximately 80% of bearings are lubricated with grease. Grease analysis allows verification of the suitability of certain greases in specific applications and can detect possible unacceptable deviations from batch to batch. Grease analysis allows for the adjustment of re-lubrication intervals. It indicates abnormal wear patterns, water or dirt contamination and incorrect grease addition.

Detect & Identify contamination

Greases operate in harsh environments having to endure immense pressures providing protection to vital components, temperature changes, and debris and moisture in the system. Water ingressing into a lubricant can lower viscosity decreasing the lubrication provided by the oil. High water levels can also lead to build up corrosion on components.

Elemental Analysis & Wear Analysis
Grease samples will undergo a full elemental analysis. This will provide information on a full range of factors that could be occurring within a system. Thought this analysis assessments of:

- **Wear on components** can be determined and potential components that could fail identified, also allow for increases in wear that could lead to failures can be identified.
- **Contamination** that enters the system can be identified and allowing for an understanding of where/how the contamination is coming from and entering the system.

Chemical Analysis of oil Make-up

Additive Package Levels can be gauged to ensure that the oil is able to provide the lubrication required. Also should you have special requirements of your additive package you will know whn to top up or replace the oil in use.

Contents

Identification of Wear Metals – Elemental Analysis

via Full Spectrographic Analysis ASTM D5185 standard

ICP elemental analysis is carried out on all samples sent to our laboratory apart from diesel fuel and petrol samples. Elemental identification is carried out via the ICP-AES technique. The ICP-AES uses super-heated plasma to excite atoms and ions within a sample until they give off electromagnetic radiation of various wavelengths. Each element in the periodic table gives off its own unique wavelength and intensity when heated that is identifiable by the internal detector within the ICP machine. This allows the machine to calculate the amount of each element is present within the sample **reported in parts per million** of each element in the sample.

Pros: Provides detailed information on components within systems that could be wearing abnormally. Allows for wear, contamination & additive levels to be observed in a sample.
Cons: Can only detect particles up to 15 micron in size. Larger particles will block the sensor and not be read.

Wear Metals Detected via ICP	
Element	**Source**
Aluminum	Bearings, Blocks, Bushings, Cylinders, Housings, Pistons, Motor Housings
Copper	Babbitt Bearings, Cam Bushings, Clutches, Steering Disk, Brass, Bronze, Oil Pumps
Chromium	Exhaust Valves, Sleeve Liners, Low Alloy Steel, Oil Coolers, Rings, Roller Bearings
Iron	Bearings, Engine Block, Crankshaft, Cylinders, Pistons, Cam Shaft, Gears
Lead	Babbitt Bearings, Journal Bearings, Bronze Alloy, Solder, Balancing Weights
Nickle	Hardened Steel, Stainless Steel, Plating
Silver	Bearing Overlay, Needle Bearings, Oil Cooler, Wrist Pin Bushings
Tin	Bearing Cage, Babbitt Bearings, Bearing Flashing, Piston Overlay, Solder
Titanium	Gas Turbine Bearings, Turbine Blades
Vanadium	Turbine Blades, Valves

Ferrous Wear / PQ Index

Using the 51FW meter

As the ICP analysis only covers particles up to 15 micron without becoming blocked then a method of detecting larger particles is required. This is carried out via the ferrous wear Index (FW Idx). Ferrous particles are selected for this as in most common equipment ferrous metal tend to represent the most common metals in components, also the FW Idx can be quickly, and cost effectively measured.

No matter the test, trending is always the most useful method for identifying impending issues, however one additional correlation may be made between ferrous content and iron by elemental spectroscopy. If the iron by elemental spectroscopy is elevated, but ferrous wear concentration remains low, it may be surmised that the wear particles are small (<10 microns) and therefore from normal wear modes. When results from both tests are elevated, then the wear mode is likely transitioning from normal to abnormal; and if iron by elemental spectroscopy is low or consistent, but ferrous wear concentration is elevated or increasing, then the wear particles are likely large (>10 microns) and considered to be due to abnormal or severe wear modes.

Pros: Provides a count on total number of magnetic particles irrelevant of size.
When used in correlation with ICP analysis allows users to see if normal or abnormal wear is occurring.
Cons: Not all methods of calculating the FW Idx are the same.

Contamination Testing on Greases

Identification of Contaminates – Elemental Analysis
via Full Spectrographic Analysis ASTM D5185 standard

Contaminates detected via ICP	
Element	**Source**
Boron	Coolant Inhibitor, Anti Wear Oil Additive, Ext Pressure Oil Additive, Detergent Oil Additive
Silicon	Cement / Road Dust, Fly Ash, Glass, Granite, Grease, Limestone, Sealant
Sodium	Coolant Inhibitor, Dirt, Fly Ash, Grease, Road / Sea Salt

Water Count
Using Karl Fisher ASTM D1744

Water Counts conducted using the Karl Fisher method are determined by, having a reagent that reacts with water and then converts the water into a non-conductive chemical. Samples analysed in our independent laboratory the coulometric Karl Fisher approach is used. In this method the reagent and solvent (normally Methanol or ethanol) are combined in the titration cell. Once a sample is added to the cell an electrical current is passed through, the total water count is calculated by measuring the current required to make the water in the sample react with the reagent.

Pros: Able to detect water content from 1ppm to 100%

Cons: Additives that contain elements like phosphorus can provide erroneous water counts.

Testing Chemical Make-up of Greases

Assessment of additives and additive depletion – Elemental Analysis
via Full Spectrographic Analysis ASTM D5185 standard

Contaminates detected via ICP	
Element	**Source**
Barium	Fuel Additive, Grease Thickener, Detergent Oil Additive
Calcium	Detergent Oil Additive, Rust Inhibitor Oil Additive
Magnesium	Detergent Oil Additive, Dispersant Additive, Hard Water
Manganese	Detergent Oil Additive
Molybdenum	Friction Modifier, Anti-Wear Additive
Phosphorus	Anti-Wear Additive, Ext Pressure Additive
Zinc	Anti-Wear Additive, Inhibitor

Company: Filtration Analysis Services Technology Ltd
Address: Unit 4, Foxwood Road
Dunston Trading Estate
S41 9RF
Phone: 01246268900
Email: info@fa-st.co.uk

Sample Num: ****30	**Sample Date:** 01/01/2022	**Database:** FAST
Area:	FA-ST Database	
Equipment:	FA-ST Bearing	
Point:	Grease Point	
Comments:	GREASE COLOUR DARK BROWN: THE GREASE IS SOFT AND SMOOTH IN CONSISTANCY AND HOMOGENOUS IN APPERANCE. IRON, LEAD AND FW LEVEL IS HIGH.THE GREASE IS VERY WET. READINGS INDICATE BEARING WEAR. WE ADVISE SCHEDUALING A GREAASE CHANGE TO REMOVE THE CONTAMINATION. MONITOR VIBRATION READINGS FOR ANY ABNORMALITIES AND CHECK IF ANYTHIN OF CONCERN IS DETECTED. RESAMPLE AFTER ACTIONS TO MONITOR AFFECT.	

Sample Num	*****30	**Sample Number is Very important**, use this if contacting FA-ST so we can find your sample
Sample Date	01/01/2022	Date Sample is taken
Unit Usage	400	Total Equipment Usage
Oil Usage		Equipment usage since previous sample
Oil Added		Amount of fluid added

Wear

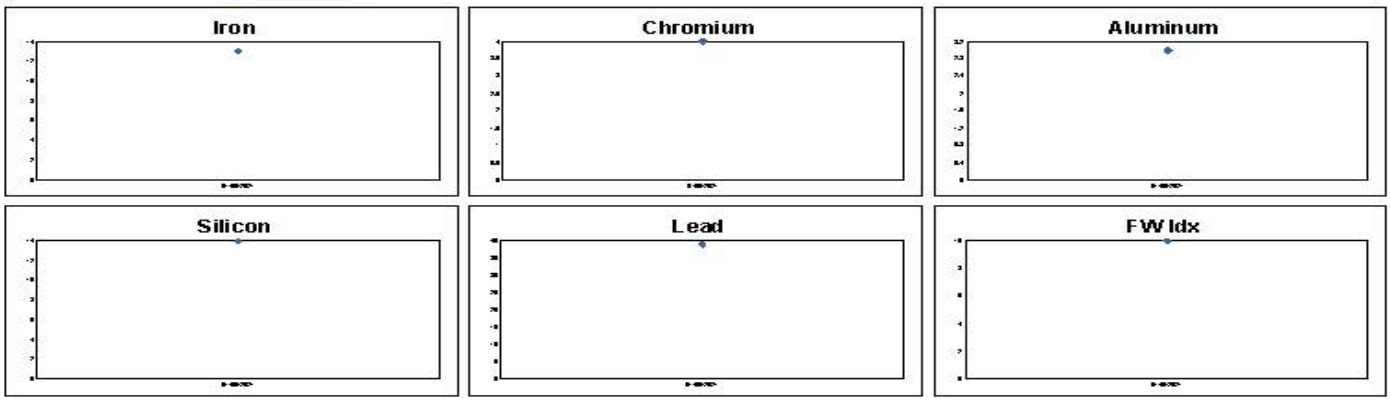
Aluminum	3	Wear Metal counted ppm	Grease samples will have the elemental analysis carried out via ICP. This will provide you with information as to what aspects of the Transmission might have additional wear occurring.
Chromium	2	Wear Metal counted ppm	
Copper	10	Wear Metal counted ppm	
Iron	4166	Wear Metal counted ppm	
Lead	59	Wear Metal counted ppm	
Nickel	0	Wear Metal counted ppm	A Ferrous Wear (FW Idx) is also carried out to identify magnetic particles in the oil. The ICP will only detect particles up to 15 in size. The FW Idx will provide a total count on magnetic particles irrelevant of size.
Silver	0	Wear Metal counted ppm	
Tin	15	Wear Metal counted ppm	
Titanium	0	Wear Metal counted ppm	
Vanadium	0	Wear Metal counted ppm	
FW Idx	647	Total Magnetic Metal Index	

Contamination

Boron	16	Contamination Element (ppm)	ICP will also detect contaminate elements.
Silicon	14	Contamination Element (ppm)	
Sodium	3	Contamination Element (ppm)	
Water K.Fish	2	Measured (ppm) until 2% then %	K.Fisher monitors water levels in the oil

Chemistry

Barium	3	Additive (ppm)	ICP will provide counts on additive levels in the oil to monitor depletion.
Calcium	2993	Additive (ppm)	
Magnesium	668	Additive (ppm)	Oil viscosity will ensure that the oil is able to preform the lubrication & heat transfer properties expected of Wind Turbine gear oils.
Molybdenum	8	Additive (ppm)	
Phosphorus	1439	Additive (ppm)	
Zinc	1594	Additive (ppm)	.
Manganese	30	Additive (ppm)	



Oil & Fuel Sampling

With our wide range of sample bottles and containers our customers can take a wide range of samples including oils, diesel fuel, coolants, glycols and a selection of chemicals and other fluids. Supplying our customers with:

Vacuum Sampling Pumps
Sample Bottles
Sample Tubing
Complete Oil & Fuel Sampling Kits

Oil Analysis

FA-ST provide a comprehensive range of oil testing allowing you to determine the cleanliness, contamination, chemistry and identify wear particles in lubrication oils, diesel fuel, coolants, and greases etc. at our independent oil analysis laboratory.

With the support of the FA-ST oil analysis program you can consistently monitor the quality of the fluids used on your machinery & equipment, detect potential component failure, reduce maintenance costs and help decide the correct oil change intervals.

Oil Filtration

FA-ST have an extensive range of oil filtration equipment especially designed to remove particulate, water and magnetic particles from oils, diesel fuel, coolants & glycols. Working with some of the industries leading businesses we aim to bring you the finest filtration equipment on the market including:

Oil, Diesel & Glycol Filtration Systems
Filter Cartridges for a wide range of fluids
Magnetic Pre-Filters
Bypass Filter Systems

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For all your oil sampling, filtration & Analysis needs contact FA-ST:

Phone +(0)1246268900
Email: sales@fa-st.co.uk
Visit: www.oilsampling.co.uk

Reduce Reuse Recycle