WEAR CHECK AFRICA

TECHNICAL BULLETIN

ISSUE 5

How to get the most out of your oil analysis programme

Oil analysis works on the principle of establishing normal wear trends.

Maintenance staff need to understand their role is critical

The effectiveness of an oil analysis programme is significantly affected by how well maintenance staff understand the programme and by the quality of their input to Wearcheck. This bulletin gives an insight into the different factors which can influence the effectiveness of oil analysis and so help companies get the best results from their programme.

An important fact to bear in mind is that oil analysis should not be viewed as a replacement for normal maintenance techniques. It is a first-stage monitoring tool which identifies a problem and where it exists. Thereafter, diagnostic tools are used (i.e. oil pressure gauges) to physically confirm the problem and isolate the defective component. Oil analysis complements diagnostic tools, it does not replace them. When the information from all testing sources is combined, the result is a powerful management tool for monitoring and controlling the mechanical condition of a fleet or factory.

At the outset it is important to appreciate that oil analysis works on the principle of detecting progressive wear by establishing a baseline of normal wear metal and contaminant levels and trending the results from subsequent samples.

In the case of a first-time or one-off sample, the health of the component can be determined if the database contains sufficient information on that type of component to produce a statistically normal set of results. However, when sufficient information is not available, it makes interpretation of the sample data extremely difficult, particularly as operating conditions vary considerably from site to site, and this is not the preferred method of applying oil analysis.

1 Undetected failures

Because oil analysis works on the principle of establishing normal wear trends, it is not able to detect sudden catastrophic failures. Examples of what may cause these failures are listed below :

Shock loading

In vehicles this is normally caused by driver abuse or overloading. An erratic wear pattern is generally an indication of operational problems and should be investigated.

Metal fatigue

Components have a finite life and due to oscillations become 'tired' and break. This can be a problem on rebuilt engines in particular where the cylinder head may have been in service on several previous power units. Component tracking is needed to be able to assess the state of the existing unit.

Lack of oil

If a component runs short of oil, irreversible damage will be done to the wearing parts. Topping up with lubricant after this has happened does not solve the problem and it is only a matter of time before failure occurs.

Incomplete removal of debris after failure

Wear debris must be removed from a component after a failure or it will end up between the wearing parts and cause a second breakdown. This occurs especially when a differential housing is not cleaned or an oil cooler on an engine is not replaced after a failure.

Torching pistons

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When an undetected failure occurs it is important to investigate the cause fully.

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Oil analysis depends on the integrity of the samples and information supplied.

should be dated, marked and stored so that, in the case of a failure, the true cause can be established. This is made possible by inspecting the size, shape and concentration of the wear debris and from this the wear mode can be identified.

4 Maintenance procedures

Specifications for all measurements taken on a component, such as oil pressure and compression readings, should be available to the maintenance staff as it is necessary to know whether or not the result is acceptable. It is possible to trend the readings within the specifications to obtain even more information on the health of the machine.

5 Regular sampling

Intervals between samples should not be too long. The recommended periods should be in the region of 250 hours (10 000 km) for engines, and 500 hours (20 000 km) for other components. If samples are not taken regularly, a wear problem could degenerate from borderline to critical, and failure could occur with no apparent warning.

6 Sample quality

Oil analysis depends entirely on the integrity of the sample. If the sample has been taken incorrectly and is contaminated or taken from an incorrect sampling point, the results will not be representative of the main body of oil and erroneous conclusions will be drawn.

The sample must be taken hot and well-mixed. Oil samples can be taken from the drain plug as the oil is drained, or a thief gun can be utilised. Another method is to use the sampling valve which should be located at a well selected point on the component, i.e. not after a filter or on a dead leg.

Samples taken at failure cannot be taken with the machine running and this could lead to an unrepresentative sample being submitted.

7 Sample information

To obtain the best results from the programme, information supplied with the sample must be accurate and complete. If all the relevant facts are not available to the diagnosticians when they interpret sample results, an incorrect diagnosis could be made. Critical information includes :

Correct identification

The fleet or serial number and the component need to be correctly identified. If the clerk transposes the fleet number or writes left instead of right, the results will be recorded against the incorrect piece of equipment.

In the event of the results indicating a problem, the wrong component will be stripped and will probably show no fault. This could make oil analysis appear unreliable.

Service meter reading

This is important information as a new component will wear differently from an old one. If the diagnostician does not know the age of a piece of equipment, he is unable to give an accurate assessment of the results.

Length of time oil has been in use

This is necessary as the levels of wear metals increase with time and what is normal for 500 hours could be critical for 100 hours.

Oil consumption

If this is high, the oil is effectively being changed often between service intervals. This results in low figures which, if the oil consumption is not known, could be diagnosed as normal wear levels.

Maintenance history

Different wear patterns will be present if maintenance work has been carried out on a component.

Brand and grade of oil

The diagnostician examines the brand and grade of oil described on the submission form to ascertain whether the manufacturer's recommended lubricant for that component is being used. Then he examines the results obtained on the sample to ensure that the additive package and viscosity match those of the described lubricant.

Feedback from users is all-important.

8 Feedback

The flow of information should not stop at diagnosis. Relevant feedback on action taken to rectify the problem needs to be returned to the laboratory. If the problem persists, then the diagnostician can consider what maintenance work has been carried out and make alternative suggestions on how to deal with the problem.

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Quick tips to maximise benefits from your oil analysis programme

1 Ensure there is total commitment from top management all the way down to the workshop floor.

2 Make members of the maintenance team aware that their efforts do make a difference to the longevity of their machines.

3 Clearly define and communicate sampling policy and frequency.

4 Appoint and **TRAIN** responsible people to take the samples and complete the sample submission forms accurately.

5 Appoint a **COMPETENT** senior mechanic to carry out the troubleshooting and ensure that all physical diagnostic tools are available.

6 **TRAIN** a clerk to keep accurate records of oil analysis and physical tests carried out on components at service intervals and during troubleshooting.

7 **Ensure that feedback is returned** so that oil analysis records can be updated and the information is available to the diagnosticians.

If these steps are followed, your oil analysis programme will save you time and money, and give you peace of mind.