SHORT GUIDE FOR

OIL ANALYSIS

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1 Introduction

Oil analysis is a powerful condition monitoring tool if performed well. This short guide informs about the parameters that are monitored, but also about how to obtain a sample. This is important because the sampling method has a major influence on the quality of the oil analysis program.

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2 Which condition is monitored?

With oil analysis two parameters are monitored, these are; the condition of the oil and the condition of the installation. Regarding the condition of the oil there are important parameters to monitor like the viscosity of the oil. A change in viscosity could be caused by oxidative failure, thermal failure and overheating of the oil.

The TAN (Total Acid Number) is a measurement of the concentration of various acids in the oil. These acids are usually by-products of oxidation, so the TAN may be interpreted as an indication of the amount of oxidation, thus the degradation of the oil that has taken place.

To give an base oil the needed properties additives are added, most usually elements like phosphorus, zinc, calium, magnesium and sulphur are used. During the use of the oil these additives degrade. During an oil analysis program the trend of typical elements are followed. Fast decrease of these elements indicates a degradation of the additive package of the oil.

The particle count remains one of the most important tests that give information about the contamination in the oil. Indirectly this might be wear-induced particles, or even oil degradation particles (insolubles), or contamination from outside the system.

To monitor the condition of the installation mainly elemental analysis is used. This analysis gives the possibility to follow the increase of wear particles. The parts in the installation are made of different materials. When a part is subjected to wear particles of a certain material will increase, table 1 shows the most common wear elements and the possible source.

Wear Metal	Source
Iron	Gears, bearings, cylinders, shafts
Chromium	Hardened steel (bearings), shafts
Nickel	Hardened steel, cams
Manganese	Rolling element bearings
Aluminum	Pistons, casings, some seals
Copper	Bronze (thrust washers, worm gears, bushings)
Lead	Sleeve bearings
Tin	Bronze, sleeve bearings
Antimony	Sleeve bearings
Zinc	Brass components (bearing cages)

Table 1, Some possible wear metals

For the complete installation it is key to build a reliable trend of the readings. A significant change of the measured parameters could indicate a deterioration of the oil or wear of the installation. To have the possibility for reliable trending information about the running hours, overhauls, oil changes and position of the sample point is highly important.

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3 Sampling

The results of the oil sample program are directly influenced by the quality of the sampling. To obtain a good and reliable sample the special attention should paid to:

- Only use the special cleaned sample bottles;
- Open the bottle only just before taking the sample and prevent dirt or water will fall in the bottle;
- Use the correct sample point and correct sampling method DB Asset Services advices to use a minimess connection or a vacuum pump to take the sample directly out of the carter;
- Let the installation run for at least 1 hour before sampling;
- Make sure the time between the stop of the installation and sampling is as short as possible;
- Incase of taking an oil sample with the use of a minimess connection let 250 ml oil flow out of the sample point before taking the sample. This oil will flush the sample point and prevent dirt and moisture from the minimess / minimess tube to be present in the sample.
- Supply the required information together with the oil sample

3.1 Sampling with minimess connection

A minimess connection [figure 1] can be connected to a tube in order to measure pressure or to take oil samples.

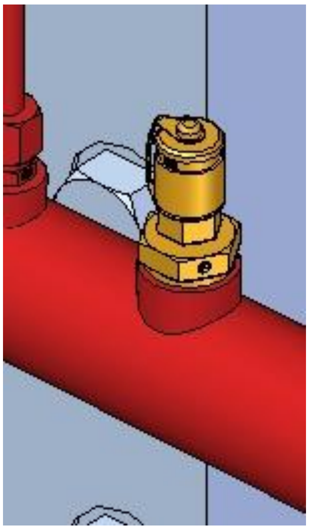

Figure 1, minimess connection

This sampling method has the advantage that the sample can be obtained during operation of the installation and if taken in the right position it will be a representative sample for the rest of the oil content.

Sampling position

The sampling position has a lot of influence on the results of the oil analysis program. It is very important to use always the same sampling method and point to obtain the sample. When using a minimess connection, the connection is preferred to be located directly after the oil pump but before the filter unit. Never use a connection after the filter unit, because the particles of interest will be filtered out of the oil. If there is any doubt about the right location please consult DB Asset Services about the best position for sampling.

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3.2 Sampling with the vacuum pump

Taking samples with a vacuum pump [figure 2] will also provide a representative sample if taken on the correct position and with a clean and new tube. The new and clean sample bottles can be mounted to the pump. The tube will draw the oil directly into the bottle.

Figure 2, Pump

Sample position
To obtain a representative sample of the complete oil content the sample position of is very important. Figure 3 shows the ideal and acceptable place in the carter. Because derbies and particles will settle on the bottom of the carter avoid sampling from that area, the obtained sample will contain a lot of settled particles and is not representative.

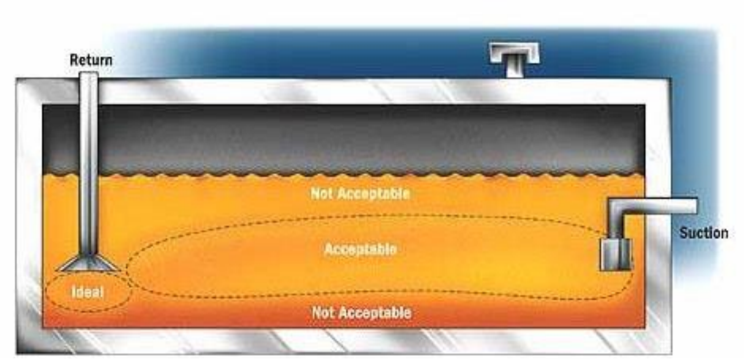

Figure 3, Sample location

In most of the cases the hole of the dipstick can be used as sampling location. The dipstick itself can be used to determine the ideal length of the tube. The ideal sampling position is just (30- 50mm) below the minimum level of the dipstick (if the oil is filled to the max) but at least 50mm above the bottom of the sump.

The exact length of tube depends of the design of the installation and should be determined on location. If there is any doubt please consult DB Asset Services. Figure 4 shows an indication to determine the length of the tube.

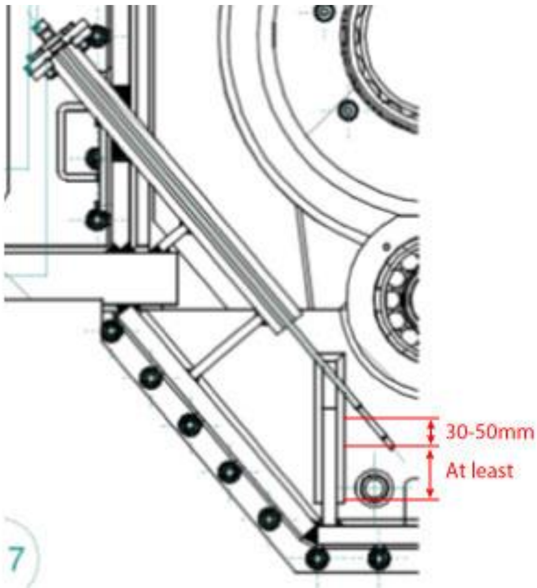

Figure 4, Sample point indication

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