

Oil Sampling – Do it Right

Compiled by Tom Dalton | March 2022

Why is it important?

In any condition monitoring case, one needs to be able to trust the data! In all cases the measurement or taking of data is the start of the process. If this is not done correctly it can skew the data and result in the wrong decisions being made.

Transformers are an expensive purchase. Most asset owners want the most of the transformer asset (the best return on investment). Condition monitoring is an essential tool to achieve this. The results give us an indication of the health of the unit, and that something is wrong internally and also to some degree the ageing of the unit.

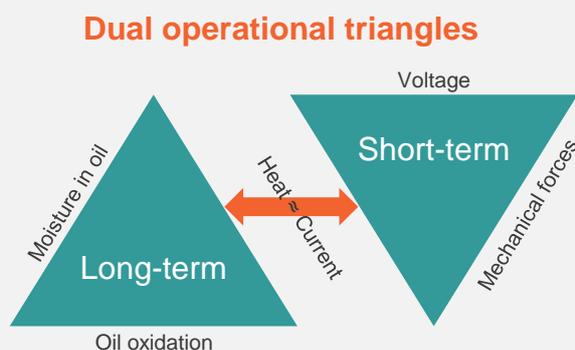
From this data, a number of decisions can be made. Doing oil sampling, one of the most common condition monitoring methods in transformer maintenance, needs to be done correctly. Correct interpretation of the results is paramount. Below are some key elements that should be considered.



Interpretation of results

Doing it right means that you need to take action when the oil sample results are showing a condition that is detrimental to the health of the transformer. There are two groups that we break the health down to:

- Short-term issues are likely to happen within minutes or days
- Long-term issues are likely to happen in many months or years
- Oil sampling is a process starting with oil sampling and ends with the interpretation of the sample data. If the entire process is not followed correctly, the interpretation of the analysis result will be inconclusive. If the data is trusted, and provides a full picture – it will greatly facilitate making sound maintenance decisions and assessing risk.



Taking oil samples

The following key elements need to be consistent when taking oil samples:

- Sample point
- Sample method
- Type of container
- Analysis partners (the lab)

Analysing oil samples

The analysis of oil samples is a complex process. To be able to rely on the data there are some important considerations to be aware of to ensure that the results obtained may be trusted.

- Labs need to regularly calibrate their instrumentation. Some types of analysis require that instruments are calibrated daily. For example, with dissolved gas analysis (DGA). With DGA, inter-lab comparisons are a great way to ensure that the analysis and calibrations are correct. Whereas dielectric strength tests of the instrument, only require annual calibration.
- For moisture analysis it is essential that the labs also run frequent inter-lab audits to check that the results they are producing are accurate or within acceptable industry standards.
- Acidity analysis can be tricky as it is determined by the amount of potassium hydroxide (KOH) added to neutralise the acid in one gram of an oil sample. (The standard unit of measure is mg KOH/g.) The acid number does not represent the absolute acid concentration of the oil sample, but inter-lab audits are a great help in checking for accuracy.

Training

Appropriate training is essential across the whole spectrum; for example:

- Oil sampler training for those who take the samples before dispatching to the lab.
- Ensuring the lab staff are trained in the analysis methods used within the laboratory.
- Training of the technical personnel who interpret and analyse the sample data.