BASIC ESA TRAINING

Stator current analysis: What is it and how do we do it?

Content

In this course, we introduce you to Electrical Signature Analysis (ESA/MCSA) as a condition monitoring technology for electric rotating machinery. After a brief introduction of the current maintenance strategies and condition monitoring techniques, the general electric machine topologies and their working principle are discussed. Next, the propagation of the most common mechanical and electrical machine failures are elucidated. Several techniques are presented on how the condition-indicating patterns and parameters can be extracted out of the electrical signals. The teachers' experience enables a pragmatic interpretation of the theoretical fundamentals, fully driven by industrial cases. At the end of the day, the training participant will be able understand the context, the goal and the weaknesses of ESA and interpret a basic MCSA diagnostic report.

Session 1 discusses the importance of the current condition monitoring systems in the industrial landscape. Inevitably, as well the applicable maintenance strategies are presented together with their strengths and weaknesses. The focus in this section is on understanding the importance of matching the condition monitoring strategy and/or technology with the drive train's Failure Mode Effect and Criticality Analysis (FMECA). Some basic fundamentals regarding electromechanics are discussed in order to straighten up all definitions in order to maintain uniformity during the following sessions.

Session 2 takes a step further towards the electric machine and its working principle. From DC to AC, from concentrated to distributed windings, from reluctance to magnetized rotors, most common machine topologies are presented with their relevance to industrial applications. Understanding the basic working principle is required to successfully differentiate between the frequency content of currents from an electric machine in a healthy condition and a problematic condition.

Session 3 gives an overview of the main types of machine failures by their occurrence. By categorizing failures as direct and/or indirect, a differentiation can be made between the reason a machine eventually fails and the reason why the machine began to fail. Bearing problems, stator winding short-circuits and common mode shaft currents are a few examples of failure modes addressed in this session. The presented modes are linked to their most effective monitoring techniques. Not only low-voltage AC machines, as well high-voltage and DC-motors are discussed in their most prominent failure modes.

Session 4 focuses on the core of this course: condition monitoring with MCSA. From power quality parametrization towards spectral analysis, several fault-indicating patterns are presented to enable a diagnostic interpretation of the machine and its drive-train. The previously discussed failure modes are matched with their reflection in the electrical signals. This section is constructed in such a way that the content is direct applicable for the attendees by using a classic vibration analyzer in combination with a commercial available standard current clamp.

AGENDA

DAY I

Timing		Description
08h00 - 08u30		Breakfast & coffee
08h30 - 10h30	**S01**	**Introduction to condition monitoring and electromechanics**
10h30 - 10h45		Break
10h45 - 12h30	**S02**	**The electric machine and its control techniques**
12h30 - 13h30		Lunch break
13h30 - 15h30	**S03**	**Failures modes of electric rotating machines**
15h30 - 15h45		Break
15h45 - 17h00	**S04**	**Motor Current Signature Analysis (MCSA)**