Chapter 12
Condition Monitoring

ABSTRACT

Implementation of all previous methods for reliability improvement needs to have enough information about condition of the converter. This is the topic of the last chapter of this book. Condition monitoring is the process of monitoring a parameter of condition in machinery (vibration, temperature etc.), in order to identify a significant change which is indicative of a developing fault. The use of conditional monitoring allows maintenance to be scheduled, or other actions to be taken to prevent failure and avoid its consequences. In this chapter, commonly used methods for condition monitoring the converters and electric machines are presented. The aim of this task is producing an alarm in converter before failure factor damage the system. Sensor based and sensor less methods for converter and motor parameter monitoring are described. The data obtained from sensor based methods is real but sensor is a weakness point in a converter. On the other hand, sensorless methods give estimated information but they are reliable. Temperature as the most important parameter from reliability point of view is a common parameter for monitoring in all systems. Other parameters like vibration, harmonics can be used for monitoring of various faults inside the system. Many typical cases are presented to demonstrate the techniques.

INTRODUCTION: PREDICTION OF FAILURE

Implementation of the methods of reliability improvement which were describes in the previous chapters needs an important tool: condition monitoring of power converter. Condition monitoring allows to inform about growth of failure in power converters. Our decision about this failure is related to the data which are obtained from condition monitoring system. For example monitoring of a long term high output current beyond nominal specification of a power electronic converter usually cause to operate the protection system and make it out of service (Kaboli, Zolghadri, Roye, Guiraud, Schanen, 2004). As another alternative, monitoring of a high temperature hotspot in this converter may leads to application of derating scenario and it holds the converter in service. In this chapter, we present the basic approaches for condition monitoring of electric power converters. There are two general goals for monitoring the state of an electric power converter:

DOI: 10.4018/978-1-4666-9429-3.ch012
1. Monitoring for controlling a variable (usually output voltage of power converter)
2. Condition monitoring for preventing a catastrophic failure

Monitoring is a key function during implementation of any control process. All of closed loop control schemes work based on monitoring of output variable of the process. However, converter condition monitoring methods are also used for informing about state of the converter from failure point of view. Monitoring is the common term of all previous chapters in this book. Many reliability improvement techniques need to have a view about the state of electric power converter. In this chapter, we describe the commonly used methods for condition monitoring of power converters. Condition monitoring is the technique of monitoring a parameter in power converter in order to identify a considerable change which is index of a developing fault. Conditional monitoring of power converters have many benefits for the converter. Condition monitoring is important in certain conditions that would shorten normal lifespan can be informed before they lead to a major failure. Condition monitoring allows scheduling the maintenance to prevent failure and avoid its consequences. Figure 1 shows the state of this chapter in the book.

*Figure 1. State of chapter 12 in the flowchart of the book*