

Multicriteria diagnosis of synchronous machines condition assessment

Test rig: fault scenarios, and configurations.

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Abstract

Develop a **smart multivariate method** capable of **early fault detection** is the aim of this research. It is intended to identify which mechanical or electrical signals are best suited to monitoring and prediction of faults in electrical machines.

It is strongly believed that this method for **acquiring data would allow timely and reliable detection of faults**, even further when used in combination with an automated monitoring algorithm or process.

Problem statement

Researching for relevant information about fault diagnosis in synchronous motor has led to literature related to permanent magnets, synchronous generators and less often, to synchronous reluctance motors.



To carry out this research was designed and built a Synchronous Motor test rig with different fault configurable scenarios.

Configurable scenarios

Available fault scenarios configurations are:

1. Healthy machine.
2. Rotor winding fault.
 1. 10% of turns shorted.
 2. 90% of turns shorted.
3. Stator winding fault



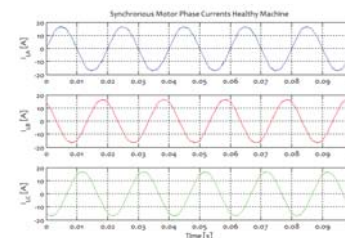
4. Static eccentricity: Five different severities of faults 10, 20, 30, 40 and 60 %
5. Dynamic eccentricity: Four different severities of faults 10, 20, 30 and 40 %.
6. Mixed eccentricity (static + dynamic).



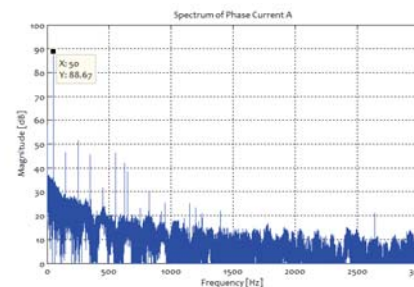
7. Mixed fault (mixed eccentricity + rotor winding fault)

Results so far – DAQ Testing

The Data acquisition system is being tested under symmetrical machine configuration.



The accuracy obtained from the DAQ is the expected. Spectral frequency representation of the signal can be seen in the Fourier series represented in the figure:



Next tests are devote to define the start-up process to be repeated on the collection for every set of data under different fault scenarios.

Experimental work

During the coming months there a scheduled a set of different experiments to collect relevant data from each fault scenario.



Future Work - RSC

The construction of a Rotor Signal Collector is in progress. Specials rotatory silver – graphite contacts were design to collect data from several rotor-mounted sensor.

