

August 12, 2013

Using Modern Technology to Measure Inductance

When comparing inductance values it is extremely important to understand the equipment and the methodology. First an understanding of the equipment is in order. In motor testing there are commonly two types of equipment used – older equipment which outputs a 60Hz signal up to the rated voltage of the motor and modern equipment which outputs higher frequencies.

With older equipment parametric measurements should be in agreement with design calculation parameters especially when measuring inductance using rated voltage at 60Hz. Measurements of these parameters requires large equipment that isn't portable, thus, making field measurements of these parameters extremely difficult.

On the other hand, modern technology has enabled accurate testing in the field of many parameters including Inductance to ascertain the condition of the motor. It should be understood that the actual value of inductance measured with modern technology such as LCR meters and the MCEMAX tester will be different than those measured using the older technology that uses 60Hz. LCR meters and the MCE tester use a low voltage (~10VAC) signal and a high frequency on the order of 1000 – 1200 Hz for inductance measurements. With the combination of low voltage and high frequency, the core steel of the motor is NOT magnetized (i.e., the magnetization level is negligible). Due to the lack of core magnetization, and thus, low permeability, the inductance values will be much lower than one would measure using 60Hz equipment or those calculated (such as design calculations) using magnetics based on 60Hz. Changes in the winding structure such as shorted turns, high resistance connections, and degraded insulation systems, can be detected in the field without having to remove or even de-term the motor. Use of modern technology equipment designed to detect very small changes in inductance and resistance in the field is important for a successful reliability program.

Please refer to IEEE Standard 1415 for a comprehensive list of modern technology measurements used to ascertain the condition of your motor.

You are invited to submit an Electric Motor Testing Tip of your own and receive a free PdMA mug or hat if we publish it! Contact Lou at 813-621-6463 ext. 126 or lou@pdma.com.

August 12, 2013

Using Modern Technology to Measure Inductance

When comparing inductance values it is extremely important to understand the equipment and the methodology. First an understanding of the equipment is in order. In motor testing there are commonly two types of equipment used – older equipment which outputs a 60Hz signal up to the rated voltage of the motor and modern equipment which outputs higher frequencies.

With older equipment parametric measurements should be in agreement with design calculation parameters especially when measuring inductance using rated voltage at 60Hz. Measurements of these parameters requires large equipment that isn't portable, thus, making field measurements of these parameters extremely difficult.

On the other hand, modern technology has enabled accurate testing in the field of many parameters including Inductance to ascertain the condition of the motor. It should be understood that the actual value of inductance measured with modern technology such as LCR meters and the MCEMAX tester will be different than those measured using the older technology that uses 60Hz. LCR meters and the MCE tester use a low voltage (~10VAC) signal and a high frequency on the order of 1000 – 1200 Hz for inductance measurements. With the combination of low voltage and high frequency, the core steel of the motor is NOT magnetized (i.e., the magnetization level is negligible). Due to the lack of core magnetization, and thus, low permeability, the inductance values will be much lower than one would measure using 60Hz equipment or those calculated (such as design calculations) using magnetics based on 60Hz. Changes in the winding structure such as shorted turns, high resistance connections, and degraded insulation systems, can be detected in the field without having to remove or even de-term the motor. Use of modern technology equipment designed to detect very small changes in inductance and resistance in the field is important for a successful reliability program.

Please refer to IEEE Standard 1415 for a comprehensive list of modern technology measurements used to ascertain the condition of your motor.

You are invited to submit an Electric Motor Testing Tip of your own and receive a free PdMA mug or hat if we publish it! Contact Lou at 813-621-6463 ext. 126 or lou@pdma.com.