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Harmonic Currents Are Bad For Your Motors

by Alex Wenger

COOL, CLEAN CONDITIONED POWER™

Approximately one half of the electric power used in industrial and commercial enterprises is used to power electric motors. The preponderance of these motors are large multi-horsepower 3 phase induction motors. These motors produce the mechanical power that drives escalators, elevators, chillers, air handlers, and many other applications.

Harmonic currents flowing into electric motors can be harmful because they can result in significant increase in motor temperatures. In fact, the rule of thumb for determining when harmonics are excessive, requires harmonic power to be less than 4%.

In most areas, the electric Utilities deliver near sinusoidal power to end users. (That is not true for some countries.) The largest sources of harmonic currents come from installed equipment in your facility and nearby facilities if you share a common power feed.

If you have variable frequency drives, UPS systems for your computers, desktop computers and servers, induction heating equipment, arc welding equipment, or any other high power electronic equipment, your equipment is generating harmonics to some degree. Every power supply that has rectifier diodes to convert AC power to DC power for amplifiers, microprocessors, LEDs, etc. produces harmonics because of the non-linear characteristics of the rectifier transfer function. Thyristor based lighting dimmer's produce very high harmonic currents.

Rectifiers are not the only sources of harmonics. Induction motors and other magnetic devices produce harmonics due to non-linearities in the magnetic core used to make those devices. Harmonics produce no useful motive power in electric motors. All of the harmonic currents are converted into heat. When there is a significant amount of heat, electric motor operating reliability and useful life are reduced.

The Arrhenius equation says that for every 10o C increase in operating temperature of a device, the useful life of the device will be reduced by 50%. When the harmonic power exceeds 4%, the heat effects of the harmonic currents begin to have a significant impact on the useful life of the electric motor.



The MPTS significantly reduces harmonics. In one particular case study, during a period of 4 months, the reduction in harmonics produced by the MPTS ranged from 6.2% to 8.0%. Before connecting the MPTS, the THD (Total Harmonic Distortion) varied between

9.0%.to 10.7%. Over the 4 month evaluation period, the THD in the power coming from the MPTS varied from 2.2% to 2.7%, well below the 4% threshold.

When electric motors run cooler their useful life is extended and cooling loads in your facility are decreased because less heat needs to be removed from the space being cooled.