Heat as one of the most common cause of motor failure

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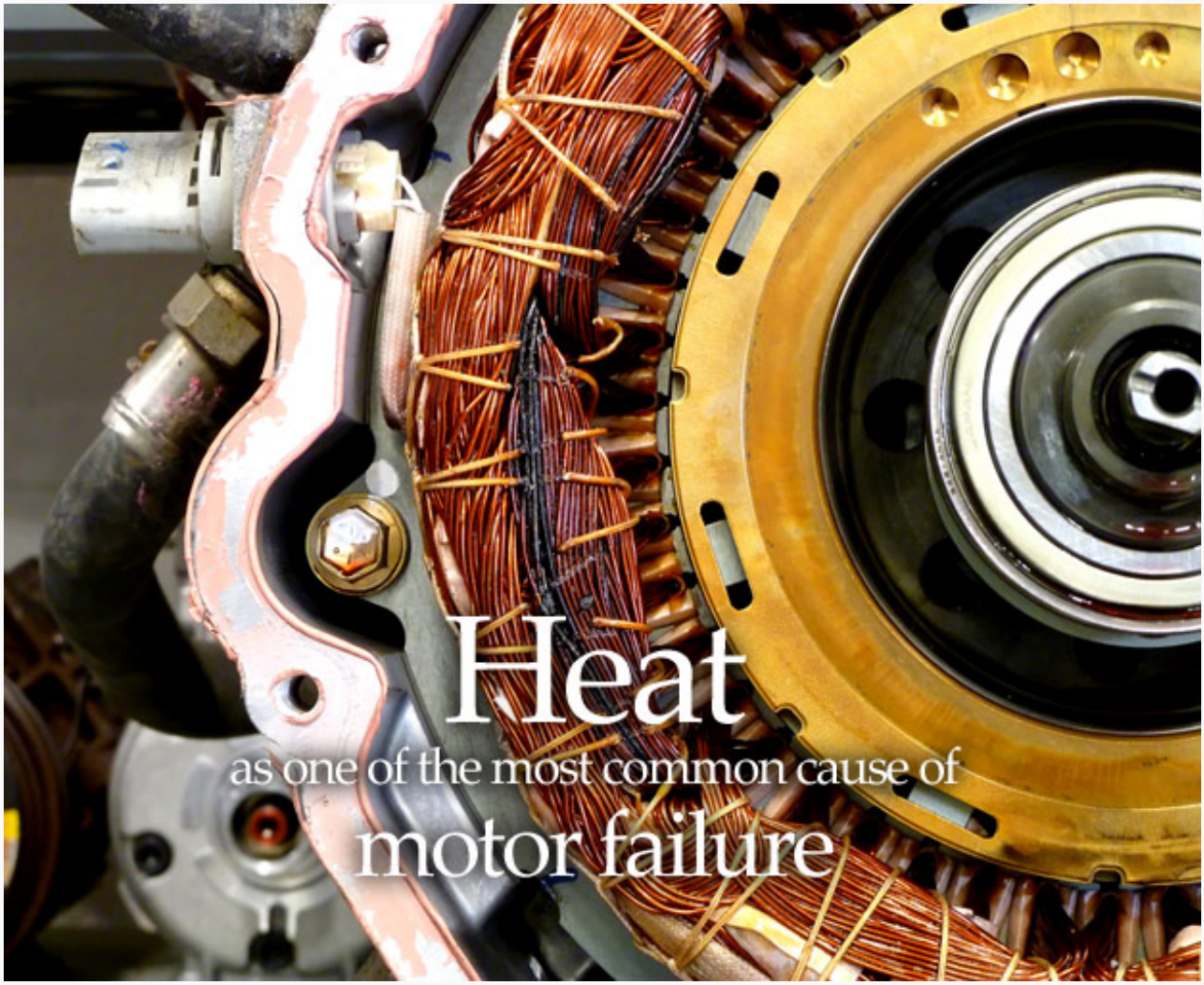

Heat as one of the most common cause of motor failure (on photo: burned motor windings due to the overheating; by hybridperformance.blogspot.com)

Service life

Heat is the most common cause of motor failure before reaching rated service life.

Every increase of ***10 degrees Centigrade*** of a motor's windings above its design operating temperature cuts the life of the motor's windings insulation by ***50 percent***, even if the overheating was only temporary.

Overheating arises from a number of factors.

If a motor is undersized for an application, or if a manager selects a motor with the wrong starting current and torque characteristics, it will operate warmer than its design temperature. Managers should always match all motors to their connected loads.

While undersizing leads to overheating, oversizing lowers the application's energy efficiency.

A number of universal factors come into play when you deal with operating temperatures, no matter what the application.

These include:

- The electrical efficiency of the motor in question;
- The ambient temperature for which the motor is rated;
- The ambient temperature in which it will operate;
- The temperature rise the motor will undergo when it is working as well as its nameplate rated temperature rise;
- The class of electrical insulation with which the motor is made; and
- The motor's service factor.

Hot environment

Another common cause of ***overheating*** is operating the motor in an environment with a ***high ambient temperature***, which reduces the rate at which heat can be conducted from the motor.

This condition results in higher-than-rated winding temperatures and shortened service lives.

Locating motors in ***inadequately ventilated areas*** or close to heat-producing equipment can easily result in ambient temperatures high enough to cause damage.

Technicians should it file temperature in areas where motors are installed, adding forced ventilation if temperatures exceed the ratings for a motor. Even if the ambient temperature is within the manufacturer's guidelines, plugged air passage, blocked cooling fans, and dirty cooling vanes will result in elevated motor operating temperatures.

Managers should make sure technicians inspect motors at least annually to ensure that their cooling components are clear.

If the motor is enclosed (in a furnace, for example, or within a protective housing such as a pump housing), the ambient temperature that motor experiences is actually the temperature of the air immediately surrounding the enclosure. This suggests you will have to consider dissipating the temperature within the enclosure by passive or positive ventilation.

If you are comparing an enclosed motor with a similarly rated open and ventilated motor, you will need to consider the difficulty involved in dissipating the heat involved in the operation of the enclosed motor.

Enclosed motor (on photo: Baldor Single Phase Totally Enclosed General Purpose Motors)

References:

- James Piper, Maintenance Solutions
- Beating the Heat, Century

Source: http://electrical-engineering-portal.com/heat-as-one-of-the-most-common-cause-of-motor-failure