Rotor sensing to accurately design and manage electric motors

Key Benefits

- **Higher accuracy** in temperature data
- **Decreases manufacturing costs** by allowing engineers to optimize permanent magnet size
- **Optimizes asset management** via direct rotor surface temperature monitoring
- **Avoids** the requirement to **calibrate** each motor
- **Measurements are independent** of the power regulator

The Challenge

Lots of electric motors are using **permanent magnets** in their operation. Permanent-magnet motors are smaller, lighter, more efficient and reliable than other singly fed electric machines.

However, a key characteristic of permanent magnets is that they can **lose their magnetization** due to high temperatures. Rising temperatures are always a concern in motors so permanent magnet motors are designed by over-sizing the magnets to prevent demagnetization if the temperature surpasses the expected value due to non-controlled variables.

The fact that the rotor is in continuous movement makes it impossible to wire a sensor and changing batteries means stopping the rotor. For these reasons indirect temperature data is gathered at the stator.

The Farsens Solution

An RFID system that works with **battery-free temperature sensor tags** allows for rotary parts' temperature monitoring.

RFID sensor tags are fixed in different positions on the rotor surface while an RFID reader antenna is located in the stator. Sensor tags transmit data to provide users with information to **build a thermal map** of the rotor of the electric motor.

Accurate temperature information helps engineers design motors without having to oversize the magnets. The **real-time temperature monitoring** solution will alert about critical temperatures so the rotor can be slowed down or even stopped to prevent damages.

Higher temperature accuracy – direct measurements

Sensors are located directly on the surface of the rotor. This allows a direct temperature measurement of the rotor material instead of the current indirect temperature monitoring systems.

These indirect systems require the sensors to be located in the stator or complex, expensive systems based on power regulator control to detect remanent magnetization.

No need to calibrate each motor

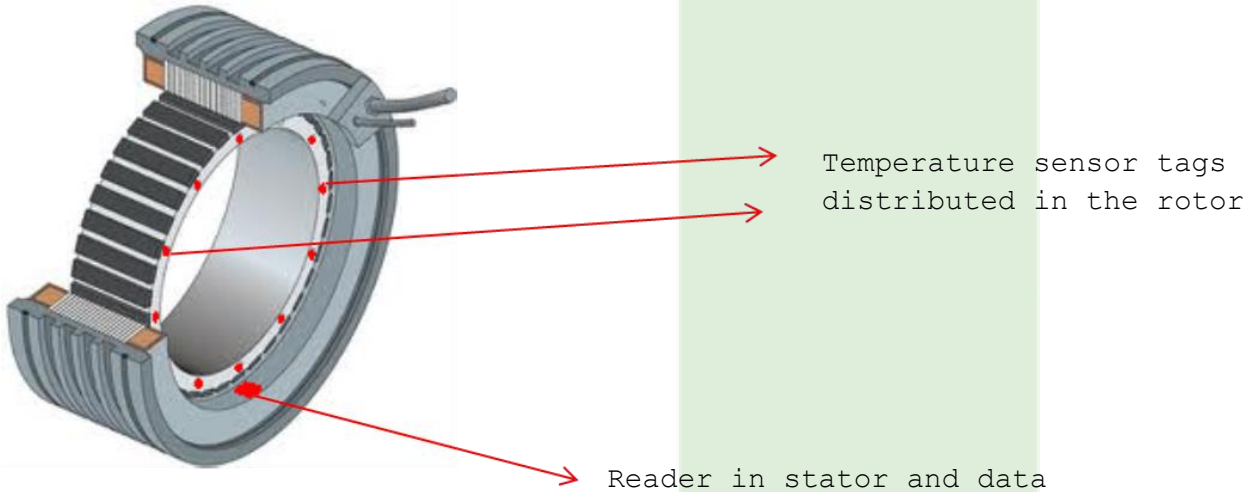
Indirect systems need to calibrate the temperature sensors. Since the temperature of the rotor is inferred from the temperature of the stator, which is what is really monitored, calibration is required for each and every motor.

The wireless and battery-free solution monitors rotor surface temperature so no such calibration procedure is required.

Reduced manufacturing costs and extended life-cycle

By accurately monitoring rotor surface temperature designers need no oversize the permanent magnets, which are amongst the materials with a higher price growth rate. Size can be optimized knowing critical temperatures will never be met thanks to the temperature monitoring system.

Moreover, once the motor is in the field, monitoring high temperatures and designing control systems will prevent the rotor from damaging due to increasing temperatures.



Temperature monitoring system for motors
Battery-free sensor tags

For more information check our White Paper at: http://www.farsens.com/landingpage/rotor-temperature/white-paper.html

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