

Advancements in Motor Testing

Current trends in quality management in the electric motor and appliance industries demand testing methods that are easy to apply, detect all malfunctions, do not require special expertise, provide fast results, and facilitate product improvement.

According to Adi Temelman, sales manager for M.E.A. Testing Systems LTD, in Netanya, Israel, "The most comprehensive method for testing motors is achieved by inspecting their characteristics: torque, current, power consumption, power output, and efficiency. These characteristics are essential information for the motor's developers. However, most of the systems that check characteristics are not fast enough. If they were, they would be ideal for detecting malfunctions in production lines." Hence, the most commonly used methods for obtaining those motor characteristics are:

- Using a mathematical model

- Loading the motor with a constant load
- Loading the motor with an inertial load

Each method has its drawbacks. Modeling is an indirect method that does not involve measurement of the motor output, and thus it is prone to errors. On the other hand, loading the motor either statically or inertially involves coupling the motor to the load. This is a time-consuming process that prohibits measuring a large volume of motors. It might introduce measurement errors if it is not done meticulously.

"In spite of everything said, coupling the motor to an external load is not mandatory for obtaining full motor characteristics," says Ms. Temelman. "The motor's rotor has a certain moment of inertia that can be regarded as an intrinsic inertial load for the sake of a load test. This moment of inertia determines the free acceleration of the motor. The entire motor characteristics can be obtained during this accelera-

tion phase."

She adds: "The motor torque can be calculated by using Newton's second law, providing the motor acceleration is measured and the rotor's moment of inertia is known. The brief acceleration phase can also be used to measure the other characteristics of the motor."

To successfully obtain readings for these characteristics, sophisticated technology needed to be developed. M.E.A. Testing Systems Ltd. provides a motor testing system based on the previously discussed principles. The system, which can be used in laboratories and production lines, is said to easily obtain fast measurements of motor characteristics. The user snaps a tiny sensor on the motor shaft, presses a button, and results are displayed instantly. The characteristics are obtained at a constant temperature as defined by the user.

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