

Introduction to the Electrical Motor Test and Diagnostics Device (EMTD)

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The R&D Laboratory of CTRL Systems, Inc. has the latest technology of diagnostics of electrical equipment, including electrical motors, starters, linear and rotary actuators, etc., based on measurements of their functional and diagnostic parameters, with the following statistical processing and analysis.

This technology was developed as a result of 25 years of experience in scientific research and design of diagnostics methods and devices of electrical drives products in aviation. It includes a package of 71 patented technical solutions, which are based on algorithms of diagnostic signs synthesis with using methods of invariance and statistical identification.

At present, this technological process is developed for electrical motors and electrical devices of low power dc (from fraction of one Watt to several kilowatts). However, it could be used for any DC electrical motor.

Direct current electrical motors are widely used in space ships, planes, helicopters, cars, armored vehicles, robots, electrical vehicles, and consumer products. Hundreds of millions of such electrical drives products are manufactured in the world every year.

The distinctive feature of this technology is a complex use of diagnostic signals of different physical nature: electrical and vibro-acoustical, including signals of ultrasound range. It ensures the best results for the test reliability, and lets to optimize the cost.

Proposed technology is totally new and its efficiency exceeds any known technology of DC electrical drives products' diagnostics available on the market.

Developed technology of diagnostics can be successfully used for the wide range of electrical products in different fields.

The following objects are the most appropriate for the use of this technology:

- For Aviation and Space Technique
 - Brushed and brushless electrical DC motors;
 - Linear and rotor actuators;
 - Electrical valves;
 - Starter-generators.
- For Automobile, Tractor, and Armored Vehicles Technique
 - Electrical power equipment (starter, alternator, battery);
 - Different electrical drive products (pumps, fans, windshield wipers, etc.)
 - Electrical valves.

- For Battery-Driven Vehicle Technique
 - Traction motors;
 - Invertors and batteries;
 - Electrical clutches.

There are different ways of industrial application of this technology, depending on Client's specific needs and tested object's peculiarities.

For companies manufacturing electrical drives products, CTRL Systems, Inc. offers to develop Automation Diagnostic System (ADS) as a means of testing and diagnostics, providing:

- Automatic testing of the object's electrical and vibro-acoustical processes, diagnostic signs' developing and analysis, and conclusion about existence of defects and degradation degree of object and its elements;
- Statistical processing, trends' detection, and prognosis of controlled parameters' changes.

The use of ADS under mass production will guarantee:

- Reliable determination of controlled objects' characteristics under all kinds of tests with the minimum amount of time;
- Possibility of detection of technological defects undetectable by other existent means.

At the end, it will increase reliability and quality of the manufactured products.

For end-users of systems with electrical drives, we offer to develop portable diagnostic device providing testing and detection of flaws in products without their disassembling and dismounting.

Possible variations of design of the portable diagnostic device include functionally completed system providing diagnostic process in real time, as well as only a register of diagnostic signals for the following computer processing.

The use of portable diagnostic device under operation condition allows drastically cut down expenses for technical servicing and search of defects.

For companies developing built-in diagnostic systems of different objects with DC electrical drives, CTRL Systems, Inc. offers to develop algorithm and software for implementation of this new technology.

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