

## **Abstract**

Currently used acceptance testing systems for asynchronous electric motors are mainly based on measurements of electrical quantities (current, voltage, instantaneous power) but vibroacoustic testing methods rely on basic vibration and noise measurements. The currently used parameterization of vibration and noise does not enable detection of manufacturing defects. It is only a tool for general assessment of electric motor quality. The improvement of current and/or the development of new acceptance testing methods for asynchronous electric motors is justified, in order to improve the quality of manufactured electric motors and to indicate the production link responsible for generation of defects in final products.

The purpose of this thesis was to develop a testing methodology, including specifying the conditions for conducting measurements and indicating their impact on the test results, as well as implementing advanced signal processing techniques and methods providing comprehensive information about the quality of the mechanical part and electromagnetic circuits of the electric motors. It was also important to develop new methods and techniques for parameterization of residual processes accompanying the operation of asynchronous motors (likewise functional parameters), enabling the acquisition of fault-oriented diagnostic symptoms.

As part of the thesis, a literature research was carried out regarding the currently used methods of acceptance testing of electric motors. Based on this research, it was found that the methods of exploitational diagnosis of electric motors leading to damage detection are mainly being developed. Detection of production defects using the methods of exploitational diagnostics may be ineffective due to the fact that the majority of information about production defects are contained in low-energy components of diagnostic signals. Moreover, the conditions of acceptance tests have a significant impact on the results of testing.

On the basis of the active experiment, the sensitivity of symptoms and diagnostic signals to intentionally introduced manufacturing defects and the impact of test conditions on the measurement results were determined. The method for evaluating the quality of motor performance on the  $v_{RMS} - f_{RICE}$  plane was proposed. In the final part of the thesis, conclusions and premises for further research in the field of acceptance testing of asynchronous electric motors were formulated.