Anotation

In industry, one of the most common materials used is rolled aluminum sheets. This material needs to be controlled very carefully and often, as it is very often used in aviation. When controlling such sheets, the main problem is the speed of control, because such sheets have significant dimensions. The use of a computerized eddy current control system with matrix transducers will significantly reduce the time required to localize the defect area, which in turn will increase the speed of inspection.

The master's thesis includes five sections. The first section includes the physical foundations and directions of development of eddy current control technologies, features of automation of eddy current control systems and features of use, in such systems, of matrix type converters.

The second section describes the principles of designing computerized eddy current controls. The methodology of formation and processing of eddy current defectoscopy signals based on the Hilbert transformation is considered. Examples of development of generalized systems using matrix converters are demonstrated. The methodology of control of identity of elements of the matrix converter is offered.

The third section describes the development of a method for estimating the parameters of defects based on the analysis of knowledge about the amplitude and phase characteristics of the signals obtained from defects. The analysis of the hodograph of the entered signals from defects is carried out, on the basis of the conducted analysis the technique of estimation of parameters of defects is created.

The fourth section provides a description and practical value of the laboratory model, selected the engine and gearbox for the construction of this model, describes all the components and the principle of the model.

The fifth section was devoted to the development of a startup project.

The aim of the study:

To develop a system for control of identity of elements of matrix converter, to offer a technique of control of identity of elements, to offer a technique of estimation of parameters of defects on amplitude and phase characteristics of signals received during control.

Object of study:

The process of formation, processing of eddy current defectoscopy signals

Subject of study:

Methods and means of detection, processing of eddy current defectoscopy signals during control, evaluation of defect diameters on the received signals.

Novelty:

The method and technique of control of identity of elements of matrix eddy current converter on characteristics of their signals formed during scanning of objects with artificial defects identical for all elements of a matrix which consists in application to signals of Hilbert transformation, definition of amplitude characteristics of signals and carrying out their statistical analysis is offered. which allows to ensure the same sensitivity of all elements of the matrix eddy current converter to defects.

A method and technique for estimating the parameters of surface and subsurface cracks is proposed, which is based on the use of amplitude and phase characteristics of signals from defects, which allows to estimate at one frequency the depth of cracks and the depth of their occurrence under the surface object of control.