

## ABSTRACT

The master's thesis consists of four sections, 90 pages, 35 illustrations, 27 tables, 30 sources of literature were processed.

In the first section there was an analytical review of non-destructive methods used in testing bridge structural elements, in which the object of control was considered, analysis methods of non-destructive control of welded joints that are used in bridge structures, analysis of the automation possibilities for systems that are using non-destructive control of welded joints in bridge structures, and described the reasoning of selection the ultrasonic echo-pulse non-destructive method of control of welded joints in bridge structures elements.

In the second section, the units of the automated system of ultrasonic control of elements of bridge structures were developed, the acoustic and electro-acoustic tracts were calculated. Structural and functional diagrams of the system have been developed and, on their basis, the nodes of the functional circuit was calculated and agreed.

In the third section, was modeled the design of system elements in «Solid Works» CAD.

The fourth section elaborates the startup project: market analysis, search for competitors, etc.

The purpose and objectives of the study:

The purpose of the study is to develop an automated system for the detection of defects in welded joints of bridge structures, based on the use of a group of ultrasonic transducers.

During the study, solve the following tasks:

- 1) To carry out theoretical analysis of methods of non-destructive testing of bridge structural elements, as well as the possibilities of automation of ultrasonic systems for detecting defects of bridge structures;

2) to develop structural, functional and electrical circuit diagram of an automated system of ultrasonic testing of elements of bridge structures; carry out the calculation and selection of elements used in electrical circuit of the developed automated system;

3) to estimate theoretically the probability of control using the developed automated system;

4) to carry out the modeling of system design elements;

5) to develop a startup project "Automated ultrasonic system for the control of elements bridge structures elements " , "Uscan-bridge".

Object of study: the process of automated ultrasonic flaw detection of welded joints of bridge structures.

Subject of study: Automated ultrasonic flaw detection of welded joints of bridge structures.

Research methods are based on the use of theoretical bases of ultrasonic non-destructive testing; calculations of the main parts of the system, modeling elements of the automated system structure in the «Solid Works» CAD.

Scientific novelty of the obtained results: 1. Improvement of the echo-pulse ultrasonic method of control of welded joints used in bridge structures elements by system automation.

Keywords: bridge structures, welded joint, defect, ultrasound, automation, piezoelectric effect, amplifier, noise, system, modeling.