

ABSTRACT

Automation of ultrasonic inspection processes for welded joints is a relevant and crucial topic in modern industry. Ultrasonic inspection is employed to detect defects in welded joints, such as cracks, bubbles, and other irregularities that may affect the strength and reliability of structures. The automation of this process involves the use of specialized equipment and software for the automatic execution of ultrasonic scanning and analysis of results. This enhances the speed and accuracy of inspections, reduces the impact of human factors, and improves overall process efficiency. Key stages of automation include the development of algorithms for processing ultrasonic information, integration with welding equipment, creation of interfaces for operator interaction, and the establishment of monitoring and reporting systems. The application of automated ultrasonic inspection of welded joints leads to improved manufacturing quality, reduced risks of defects, and increased reliability and safety in the operation of structures and machinery.

The master's thesis addresses the task of automating the ultrasonic inspection process of welded joints. The project aims to address issues related to the automatic detection of defects in welded seams.

Research Objective: The goal is to develop a device for effective monitoring of the quality of welded joints to detect all possible imperfections.

Research Object: The ultrasonic inspection process of welded seams, typical defects arising during the welding of elements, and in the course of their operation.

Research Subject: Processes characterizing the dispersion of acoustic waves in a solid isotropic medium and their response in the signal transducer, followed by analysis to formulate a decision system for further actions.

Keywords: process automation, ultrasonics, welded joints, ultrasonic inspection.