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Control for riveted connections by free oscillation technique. Hardware and software system. Evaluation of measurement error

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Abstract

© 2016, International Journal of Pharmacy and Technology. All rights reserved. The paper presents the results of studies on the development of techniques and diagnostic suite for instrumentation control for quality of riveted joints by the free oscillation technique in automatic mode. The suite consists of a recording system and a signal processing system. The registration system includes a device for positioning the inspected articles. Excitation of oscillations in an inspected article is carried out with a calibrated strike. Signal processing system is composed of a hexadecimal analog-to-digit converter and a digital computer. Acoustic signals of vane vibrations are recorded on the hard disk, and their processing is performed with a software package. The description of DetectFault software created in LabVIEW environment. The software controls the movement of a guide wheel and a striker bar, ensures registration and transformation of signals from analog to digital form with the set number of samples and sampling interval value. The control algorithm is described. Acceptance or rejection of a riveted connection is made depending on the results of comparison of a reference and the current spectrum for the Spearman correlation coefficient and the rejectable level (higher - passed, below - rejected). To classify a riveted connection as "fit" or "defective", an approach should be used that is specific to procedures on rejection of anomalies by a confidence interval. A robust weighting algorithm is used when forming the reference spectrum. The error estimation of the measurement results was carried out. The results of reproducibility of the data during the monitoring of riveted joints.

Keywords

Decision rule, Free oscillation technique, Non-destructive testing, Riveted connections, Spectra comparison