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Inspection of riveted connections by free oscillation technique.Inspection of riveted connections for “riveted wheel blades” at the production stage

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Abstract

© 2016, International Journal of Pharmacy and Technology. All rights reserved.The article presents the results of the production testing of the diagnostic system for quality instrumentation inspection for riveted connections with free oscillations technique. The test program consisted of four stages. In the first stage we selected guide cases which were new and spent a part of their resource having characteristic defects of riveted connections. In the second stage we formed reference spectra of inspected connections. At the third stage we established the relation between the numerical value of the Spearman correlation coefficient and the shear force of a blade. In the fourth stage, all tested connections were sent to additional riveting. Following the inspection with the free oscillations technique and on shear force, we have determined that shear force momentis constant and defective riveted connections were absent upon established rejectable quality levelis 0.75 of Spearman correlation coefficient. According to the tests results it is recommended to set the rejectable quality limit with regard to evaluation of Spearman correlation coefficient at 0.75that corresponds to 10 N m shear force moment of a blade. The developed inspection technique allows grading of riveted connection as “defected” and “fit” without unproductive manual inspection. Application of the technique allows quickly and with a high degree of certainty to reveal defective riveted connections in GTE guide cases what increases engine reliability and allows saving time and costs to determine the technical condition of gas turbine plants. The instrumental technique is implemented in the non-destructive inspection complex where the positioning of the inspected product, recording, analysis of vibro-acoustic signal and making conclusion on the conditions of a product is performed automatically, without operator intervention, that eliminates subjectivity in the decision-making.

Keywords

Comparison of spectra, Decision rule, Free oscillations technique, Non-destructive testing, Riveted connections