Roskosz M.
Rusin A.
Kotowicz J.

The metal magnetic memory method in the diagnostics of power machinery components

Abstract

Purpose: The paper presents the metal magnetic memory method and its application for industrial non-destructive testing. Special emphasis was put on the use of the method for the testing of power equipment and machinery components.

Design/methodology/approach: The use of the strength of the residual magnetic field in diagnostics provides macro-scale information on: material discontinuities, defects of the material structure, load history of the component, and the distribution of stresses.

Findings: A wide range of applications of the metal magnetic memory method was presented. In many applications, the use of the method provides information which cannot be obtained by means of traditional, standard methods of non-destructive testing (NDT).

Research limitations/implications: The metal magnetic memory method can be used for the testing of all ferromagnetic materials and those austenitic steels in which, due to mechanical or thermal load, delta- or sigma ferrite appears.

Practical implications: The metal magnetic memory method, as any NDT method, has some usage limitations which result mainly from the structural features of the components under examination and external conditions. Any application of the method for a specific component calls for the development of a research methodology which takes into consideration the load state of the component during examination and the values of the external magnetic field at the place where the examination is being carried out.

Originality/value: Possibilities to use the metal magnetic memory method as a defect detection method were presented. Test results were shown which point to significant capacity of the method for detecting areas prone to initiate cracks and cracks in the early stage of their development.