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Analysis of the methodology of the assessment of the technical state of a component in the method of metal magnetic memory testing

Abstract

The method of metal magnetic memory (MMM) testing is a passive magnetic method which makes use of the residual magnetic field (RMF) of the element under examination. According to standards ISO 24497 - 1, 2, 3 : 2007 the assessment of the level of stress concentration is carried out with the use of the values of the RMF component gradients. For the assessment of the state of the komponent material, the maximum value of the gradient is referred to the average value in the area dunder examination. The assessment results from examination and it decides about its quality. The aim of the research was to examine the uniqueness of the determination of the stress concentration level and the material state in the method of metal magnetic memory testing. An attempt was also made to analyze the dependencies used in the asses ment of the level of stress concentration and the state of the material. The impact of the mechanical load of the sample, of the value of the external magnetic field or of the location of the sample in the magnetic field of the Earth on the values of the RMF component gradients was examined and analyzed. The results of the resea ch made it possible to formulate the following conclusions. The maximum value of gradients occur in the areas of stress concentration. The load and the values of the external magnetic field affect the maximum values of gradients, but the area of their occurrence remains unchanged. Quantifying the level of stress concentration, the value of stress, or the assessment of the state of the material at the present stage of the development of the method of MMM testing is a disputable and doubt-raising issue. Metal m gnetic memory testing is a non-destructive testing method with a great potential to use, especially in cases where non-standard methods of non-destructive testing do not give satisfactory results. In each case, however, its application for a specific component calls for the development of a research methodology which takes into consideration the load state of the component during the examination, the values of the external magnetic field at the place where the examination is being carried out, as well as the location of the component.