KLOKNERŮV ÚSTAV ČVUT V PRAZE

Abstract

A key issue in power engineering is currently to extend the working life of energetic devices and their components beyond the design working life. Currently used procedures are presently focused on the application of common deterministic methods. Thus, it is usually sufficient to use the conservative values of the basic variables for actions and resistance for evaluation of energetic components. On the other hand, we know that the input parameters for deterministic assessment may be considered as parameters having stochastic (random) character, which can be replaced by statistical distributions in calculations. Deterministic methods should be optimized and potential resources of currently applied procedures identified. Due to a number of influencing factors, the actual state of the energetic device might be difficult to be identified. Probabilistic and statistical approaches is be used to analyze the basic problems in data collection from diagnostic measurements and their subsequent application in estimating the residual life of energetic devices and to optimize processes for their effective maintenance, diagnostics, renovation and also replacement. Data collection and quality assessment can considerably reduce number of failures and can bring major financial benefit for operators. The thesis shows the advantages of the probabilistic approach for assessment the condition of selected equipment in the energetic sector in comparison with deterministic methods. New approach of the assessment presented in the thesis facilitates to identify the needs for change of diagnostics. Selected study case is introduced in the analytical part of the thesis for the high-pressure pipeline of the production block. From the probabilistic outputs obtained, the thesis presents a possible application of these outputs to help find the optimal time for diagnosis in relation to the detected time of occurrence of the defect, the time of occurrence of the failure rate and the financial costs associated with the performance of diagnostic measurements and repairs of defects.