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IMPROVEMENT OF RELIABILITY OF THE BUCKET- WHEEL EXCAVATOR THROUGH IMPLEMENTATION OF NEW METHOD OF FAULT-TREE ANALYSIS

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Abstract

Welded joints' reliability in responsible welded structures is of the utmost importance. If such a structure, for example, a bucket wheel excavator, suffers damage or failure, the financial losses are two-folded – the machine does not deliver the required quantity of coal, while, due to that, the power plant does not deliver sufficient electricity to the industry and households. This paper presents a method, based on the probabilistic and semi-probabilistic approaches to express the coefficient of validity and welded joints weakening, defining reliability as a measure of the quality of installed vital welded structures on the bucket wheel excavators in service. The "fault-tree" analysis was applied to enable a quantitative and qualitative analysis of the welded structure failure causes, diagnostics of behavior, and structural degradation, to evaluate the integrity and estimate the service life of the vital welded structures that have a flaw in the welded joint. The database was created, as well, by which the reliability of the bucket wheel excavators can be increased. The proposed method enables to efficiently test the welded joints during all the phases, from manufacturing, via acceptance to assembling of various welded structures, e.g. machines, like excavators or cranes, or the constructions like bridges, etc.

Keywords

Bucket-wheel excavator, welded structure, fault-tree analysis, welded joint reliability.

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