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DEVELOPING AN APPROACH TO IMPROVING ENERGY EFFICIENCY WITH THE USE OF ELECTRIC MOTORS

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The level of energy efficiency is influenced by the quality of electricity supply and the way energy is used. The problem of increasing the efficient and rational use of resources requires an integrated approach to energy saving and energy efficiency management [1–3]. It is also related to environmental safety [4–6], taking into account the reliability control of the system as a whole [7, 8]. The reliability calculation model taking into account control actions is based on the following assumptions and preconditions. Calculation of reliability indicators is carried out in accordance with the design documentation. Power equipment elements of serial production are considered. In case of failure to achieve the required level or other technical characteristics and when the cause of failure is identified, design changes are carried out. Changes in structural elements are complex, i.e. they affect not only the element, the cause of failure of which is identified, but also other elements of the design, directly related to each other by functional dependence. It should be taken into account that new changes in design parameters correlate with the element whose cause of failure is known and directly affect the output characteristic of this element and, thus, indirectly affect the output characteristic of the product as a whole.

The purpose of the study is to assess the efficiency of electricity use by compensating for reactive power, and to consider the ways and methods of compensation, taking into account the exclusion of resonant phenomena in the network.

In order to increase the efficiency of electricity use with the aim of minimizing losses under conditions of restrictions on maximum power consumption, new technical means are used to improve energy characteristics. Methods of optimizing the power supply system to improve energy efficiency: ensuring sufficient cable diameter, appropriate power to reduce active losses, operating transformers at a sufficient load (more than 40 ÷ 50% of the rated power), using transformers with

increased efficiency or reduced losses, placing equipment requiring high current as close as possible to power sources. The following methods for improving the energy efficiency of electric motors are proposed: use of energy efficient motors, selection of optimal rated motor power and control of power supply quality.

Conclusions

Replacing existing motors with energy-efficient and variable-speed motors is one of the ways to improve the energy efficiency of energy-consuming installations. The first step is to optimize the entire system that uses electric motors as a whole. The second step is to optimize the individual motors within the system based on the newly defined power requirements using one or more methods as applicable.

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