# ANALYSIS OF RESEARCH CONDUCTED ON THE RELIABILITY OF ELECTRICAL SYSTEMS

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**Abstract**: *This article provides an analysis of issues such as the reliability of electric motors, reducing the failure of electric motors, the analysis of the operation of water pumps, their management, requirements for them, methods of increasing the reliability of electric motors, protective devices for electric motors, and timely detection of faults.*

**Keywords**: *Asynchronous electric drive, faults, pumping stations, electric motors, reliability, energy resource, mathematical model, frequency converter, pump unit, angular frequency, operation modes of electric drives, EHM, backup electric motors, static compensator, torque motors.*

Brief information on the operational reliability of asynchronous electric drives in agriculture is given. Discusses the comparison with foreign counterparts to reduce the failure of electric motors. The main failures of electrical equipment in agriculture were considered. Examples are given to avoid frequent power outages[1].

The analysis of the performance of water pumps used in pumping stations, the mathematical model of vector control of asynchronous motors, the calculation of mechanical characteristics, the algorithm for frequency adjusters, the development of pumps and water pipes, the comparison of the use of asynchronous motors in series and in parallel, the harmonic analysis of the output of asynchronous electric motors are considered. [2].

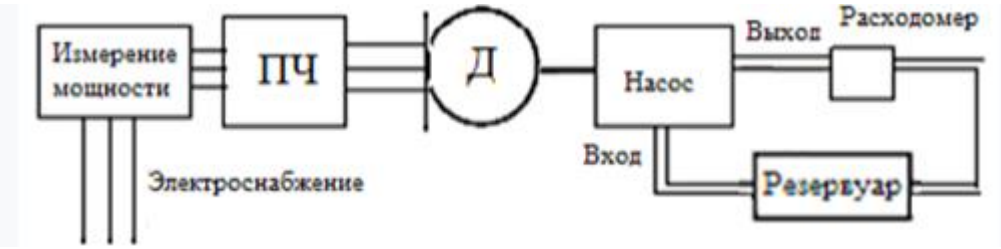
Requirements for electric motors used in agriculture, analysis of their operating modes, analysis of available methods and means of increasing the reliability of asynchronous motor units, a mathematical model for point and intermediate reliability assessment of asynchronous electric motors has been developed[3].

[4] in the dissertation, the impact of various operational factors on the consumption of energy resources of asynchronous electric motors in the specific conditions of the high level of breakdown of electrical equipment, the low efficiency of the use of electric drives and the specific conditions of agricultural production were analyzed, and a mathematical model was developed to increase the efficiency of the use of electric drives in the production of agricultural products. models and technical tools are offered.

[5] in the doctoral thesis, the main indicators of the reliability of electrical circuits, the mathematical model of the reliability of electrical circuits was developed, the calculation of the reliability of electrical circuits in EHM, the task of modeling, the creation of an algorithm for a probabilistic model, the determination of the optimal indicators of the reliability of electrical circuits of working machines, the use of highly effective

protective devices researches have been conducted on increasing the reliability of electrical systems through application.

[6] in this article, as a result of studying the literature, the possibility of energy saving and increasing the efficiency of electricity use in asynchronous electrical systems is presented. Ways to increase the energy efficiency of asynchronous electric drives are considered. The following methods and means of increasing the energy efficiency of asynchronous electric power are analyzed: switching from unregulated electric power to adjustment; introduction of frequency-controlled electrical drives; choosing energy-saving electric motors. An example of the use of the considered methods for implementation in frequency-controlled electrical operation of pumping units is given.




[7] in this article, three-phase asynchronous motors and frequency converters, as well as the algorithms of operation, structural and functional schemes of asynchronous electric drives are analyzed. Actual problems for asynchronous electrical engineering are developed.

Adjustable electric motors consist of an electric motor, adjustable power supply and protection and switching devices [8]. Backup electric motors are rarely used due to the following factors; high demands placed on modern electrical systems, complex construction of electrical systems, high price [8].

The article [9] considers the issue of ensuring the stable operation of frequency converter electrical systems of metallurgical enterprises in the event of interruptions in external power supply. Various technical solutions are provided to increase the reliability of electric drives with frequency converters. In the event of various interruptions in the mains voltage, it is proposed to use high-speed devices for automatic transfer of the backup as a means of making quick switching between the main and backup inputs. The possibility of using a static compensator to control the input condition in frequency-involving systems is considered.

B[10] The article provides brief information about the operational reliability of asynchronous electric drives used in agriculture. A comparison with the experiences of foreign experts to reduce the failure of electric motors is discussed. The main failures of electrical systems in agriculture were considered. Here are some examples to avoid frequent power outages.

Timely detection of faults in direct traction machines helps not only to prevent damage to expensive equipment, but also to ensure continuous operation of rolling stock[11].

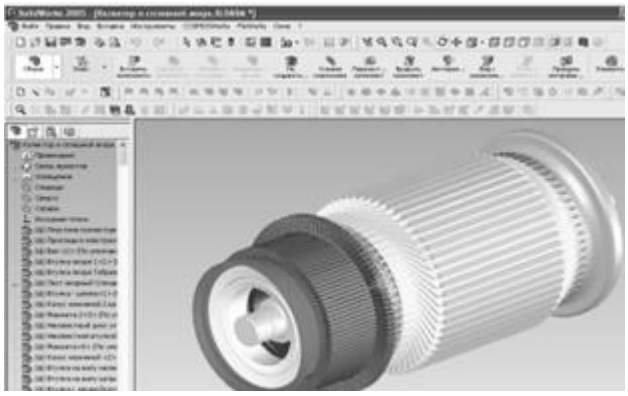


Figure 2. Anchor model of DKU-800 traction electric motor [11]

The operation of many mining machines is accompanied by very large fluctuations, which negatively affects the reliability of the electrical equipment installed there. Most of the vibrations are related to the response of the machine to the variable load and the presence of elastic compliance in the frame elements connecting the stators of electric motors to the ground [12].

In addition, in the article [12], the issues of stabilization of the elastic moment are covered in detail.

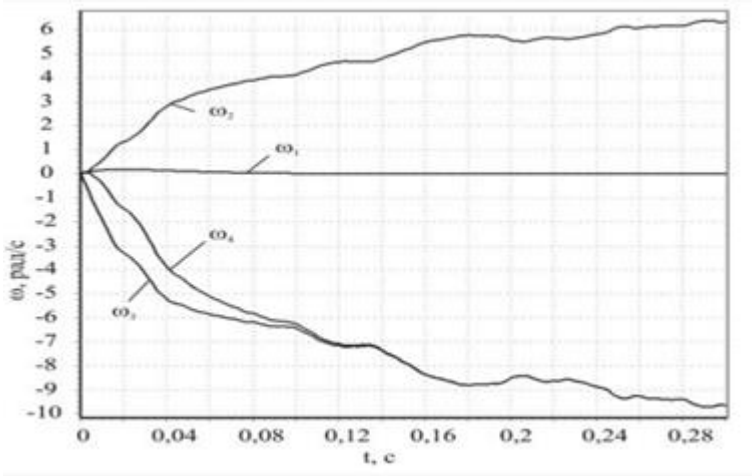



Figure 3. Angular frequency versus time graph[12]

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