# METHODS OF FORECASTING THE RELIABILITY OF ELECTRICAL TECHNOLOGICAL DEVICES

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**Аннотация:** *В статье рассматривается надежность электротехнических устройств, в том числе комплексов и процессов. Также были рассмотрены методы повышения надежности электротехнических устройств, методы их диагностики, методы и направления прогнозирования.*

**Ключевые слова:** *электротехнологические устройства, надежность, диагностика, прогнозирование, методы прогнозирования.*

**Аннотация:** *Мақолада электр технологик қурилмалар ва шу жумладан мажмуа ва жараёнларнинг ишончлилиги ҳаққида сўз боради. Ҳамда электр технологик қурилмаларнинг ишончлилигини ошириш усуллари, уларни диогностика қилиш усуллари ва прогнозлаш услублари ва йўналишлари кўриб чиқилди.*

**Калит сўзлар**: *электр технологик қурилмалар, ишончлидик, диагностика, прогнозлаш, прогноз усуллари.*

The main concept that determines the continuity and reliability of electrical technological processes is the reliability of electrical technological devices continuously participating in these processes. Reliability of electrical technological devices means that the technological device performs its functions, the values of quality indicators do not change over time or within predetermined limits.

Checking the level of reliability of many technological systems and their elements (technological equipment, products and personnel) is based on the collection of primary statistical data on failures and general failures that occur during operation or testing. The random nature of failures also determines the specifics of the requirements for information about them. These requirements are completeness, reliability, uniformity and uniformity, discreteness, timeliness and continuity.

As a rule, the operating status of electro-technological devices is determined by the list of parameters specified in the documents and the permissible limits of their change. The operation of the parameters of electrical technological equipment within the specified limits means that its reliability is at the specified level. Reliability is very important in the design of electro-technological complex and processes, and several methods of increasing reliability are considered and included in the project.

Reliability is considered an important feature of the electro-technological process and complex, and now the issues of diagnostics of electro-technological devices and reliability forecasting are important issues.

As a result of diagnostics of electrical technological devices during operation, early detection of defects is carried out, and currently there are methods for determining the

technical condition of electrical technological complexes. From the point of view of choosing the optimal strategy of technical maintenance and repair, a forecast of the development of defects and a prospective assessment of the technical condition for the next period of use are required. Forecasting the technical condition increases the efficiency of diagnostics.

Various methods described in the literature used in forecasting the technical condition of electrical technological devices and mechanisms can be divided into analytical, probabilistic and shape determination.

Analytical forecasting method. This method allows you to get the parameters of the equipment, the size of which corresponds to the size of the controlled parameters. In this case, the values of the calculated parameters describe the progress of the process in time. This method is usually used when the analytical dependence of the function of changing the diagnostic parameter over time is known.

A probabilistic forecasting method. Its feature is to determine the probability of maintaining the operation of the equipment as a function of time, i.e. the forecast result determines the probability of output and non-output of a controlled diagnostic parameter outside the permissible limits. At the same time, the following probability characteristics are defined: density of distribution of parameter values, mathematical expectation and dispersion.

Shape detection method (statistical classification). This method consists in the fact that forecasting can begin from the moment of one-time control of the diagnosed equipment. As a result of the forecast, the managed object belongs to one or another class of technical condition, which is predetermined according to the criterion of operability or durability and is taken as a standard (image). Then, based on the pattern of changing parameters of this class, they decide how this parameter will change in the future.

The choice of forecasting method is mainly determined by the required accuracy and reliability. It is problematic to get an absolutely accurate forecast of the technical situation. This is due to many factors affecting the forecasting process. The main factors include: the level of knowledge of the diagnostic process under investigation, the depth and frequency of diagnostics, the accuracy of the measured parameters, the chosen method of forecasting, etc. Therefore, the correctness of forecasting the technical condition of electrical technological devices can only be approximated.

When forecasting the technical condition of electrical technological devices, the following tasks are solved:

• the assembly units of the equipment are identified, the technical condition of which will change significantly during the next period of use;

• parameters and signs of changes in the technical condition of electrical technological devices are monitored;

• values of diagnostic parameters are normalized;

• diagnostic indicators are compared with their normative values;

• moment, absolute value and duration of diagnostic parameters of electrical technological devices exceeding the permissible limits are recorded;

• collection, display and registration of processed information is carried out;

• primary processing of diagnostic data on the technical condition of the equipment is carried out;

• the current and prospective values of the summarized resource indicators of the technical condition of the monitored equipment are calculated;

• periods of preventive maintenance aimed at improving the efficiency of electrical technological devices are determined;

• employees are informed about the technical status and recommendations for appropriate changes in the operation of each electrical technological device.

In conclusion, it can be said that the reliability of appropriate electrical technological devices is directly related to the uninterrupted operation of electrical technological processes and complexes, their efficiency reduction and production capacity. Therefore, the production of algorithms and methods that provide the possibility of predicting the technical condition of electrical technological devices, their serviceability and their failure in advance creates a basis or provides an opportunity for the long-term operation of devices and, in turn, to ensure the continuity of technological processes in industrial enterprises. In this regard, the development of forecasting methods and algorithms is an urgent problem. Currently, the production of forecasting methods and algorithms using artificial neural networks is considered optimal due to the fact that the accuracy of these networks is at a low level.

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