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THE QUALITY OF MANUFACTURED PRODUCTS AND THE RELIABILITY OF ELECTRICAL SYSTEMS OF ENTERPRISES WITH CONTINUOUS TECHNOLOGICAL PROCESSES

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ABSTRACT
The article deals with the analysis of reliability in power supply systems of light industry enterprises and electric power failures that affect the quality of manufactured products. Development of methodological support of reliability and increase of stability of switching devices, relay protection and automatics at substations 35-110kV.

Keywords: reliability, failure, short interruptions in power supply and product quality.

Introduction

In this article I want to talk about the relationship between the quality of products and the reliability of the power supply of the enterprise. As we know, in order to successfully compete in the market, each company must comply with international standards called ISO. Successful competition mainly depends on the quality of products. The quality of products depends on its value, the higher the quality, the higher the cost in the world market.

Main part. Electrical installations used for the conversion, transmission and distribution of electricity are exposed to a large number of factors: environmental influences, operational, accidental, design and installation errors.

To transmission devices - overhead lines of all voltage classes - the main factors contributing to their failures are rain, sleet, thick fog, frost, etc., and for cable lines and power transformers installed in open-type electrical installations, to environmental factors include solar radiation, atmospheric pressure, ambient temperature.

In short, the real number of failures and failures of elements of electrical systems is non-stationary, since the frequency of failures λ depends on the

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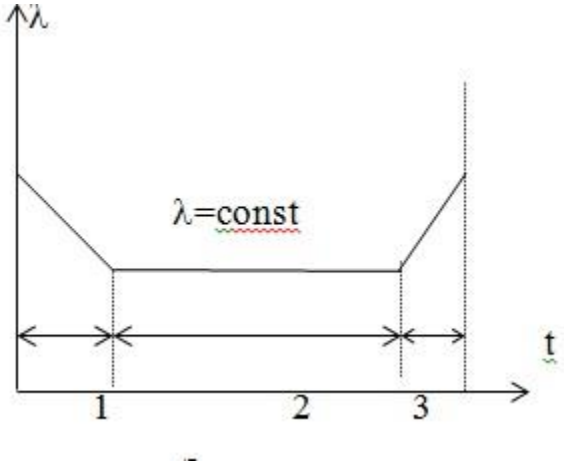
operating time t. Based on this, you can build a simple graph of the dependence of λ on t, which is called the characteristic of the object



Here: 1-period of running-in - the period of detection of hidden defects in installation and manufacture ("detection" of defects (1 - 3 years)); 2- period of normal operation; characterized by an approximately constant failure rate. As we know, in cases of emergency shutdown of one consumer connected to the 6-10 kV bus section at substations, there will be no consequences for other consumers that are powered from this bus section. In case of damage to outgoing cable lines of 6-10 kV at substations of 35-110 kV, the shutdown time for the maximum current protection of automatic switches is set to 1 second, and the introductory switches are even longer, as a result of these shutdowns, there will be a violation in the power supply to other consumers of the 6-10 kV buses connected to this section resulting in emergency shutdowns of a part of technological processes characterized by high requirements in terms of continuity, quality and reliability of power supply. At the 110/10/10 kV Strelkov substation (which is connected to dozens of textile and light industry enterprises) and other substations, change the undervoltage protection trip rates of the electrical load nodes of the electrical system, which consists in lowering the minimum allowable voltage level and increasing the undervoltage protection response time delay.

We know that voltage drops have a great impact on the operation of asynchronous motors, and subsequently lead to a change in the mechanical characteristic, which is the dependence of the electric motor torque on the rotational speed or slip, the sinusoidal mode of operation of the frequency converter is violated, which leads to an emergency stop of the process equipment.

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For electrical machines, transformers and cables, the most significant thermal aging of the insulation. An electrically insulating material, being in an electric field, loses the properties of an electrically insulating material if the field strength exceeds a certain critical value.

As we know, if there is a significant voltage drop at the terminals of a full load motor, the drag torque of the mechanism can be greater than the maximum torque of the motor. In this case, there will be a “jog” of the engine and a repeated automatic start of electric motors or electric drives, a voltage dip will pass into the system as a whole. With a decrease in voltage, the conditions for starting the motor worsen, since the starting torque decreases and the constant resistance torque of the mechanism increases the current consumed by the electric motor, which leads to an increase in winding heating losses.

Conclusion

It is necessary to change the rates of operation of the undervoltage protection of the electrical load units of the electrical system at substations, which consists in a reasonable decrease in the level of the minimum allowable voltage and an increase in the time delay for the operation of the undervoltage protection, as well as relay protection of the sectional device to be performed according to a two-phase two-relay circuit with a limited time delay .

It is necessary to protect cables from direct solar radiation on openly laid cable structures and overpasses, not forgetting free access to these structures for maintenance personnel.

Improving the characteristics of the main elements of substations-35-110kV by means of automation. AR of three-phase and phase-by-phase, high-speed protections. To reduce non-sinusoidal voltages (reduce higher harmonics), a separate power supply is used for consumers with a non-linear current-voltage characteristic. To effectively improve the reliability of power supply, it is necessary to provide and develop rational organizational and technical measures for the operation of energy systems. At the same time, one of the important tasks of operation is the creation of a well-established system for collecting and processing information about electrical equipment failures.

At the same time, one should not forget that for the efficient operation of energy systems it is unthinkable without strict observance by the personnel of the energy supply organization.

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