ANALYSIS OF POWER UNITS OF POWER PLANTS AS A CONTROL OBJECT

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Despite a relatively simple structure with practically a single type of product and a relatively small range of consumed raw materials and materials, a modern power plant (PP) is a complex control object with numerous external and internal connections and limitations. Features of the power industry, which distinguish it from other sectors of the national economy, make it possible to single out the contours of operational dispatch control (ODC) and production and economic (PCU) control in a typical power plant management structure.

Each of them includes technological equipment, teams of people, controls, material resources and other components of the production process. Although these circuits are closely interconnected and work in concert in the overall ES management system, their goals and objectives are different.

The purpose of the ODU is to ensure the planned production of electrical and thermal energy of acceptable quality within the specified time frame. The purpose of the PCU is the implementation of production tasks at minimal cost, as well as material and social support for production.

The general task of the control system in the ES is to ensure the most economically advantageous mode of operation of the power system, in which consumers continuously receive energy of acceptable quality at the lowest national economic costs for its production, transmission and distribution.

The technological complex in the energy sector "power plant-energy unit-unit (steam generator, reactor plant, turbogenerator, etc.)" is a typical example of a complex multi-level and multi-functional control system with distributed parameters. When modeling the control organization system for such a complex one can use a simplified concept of a generalized control object, characterized by only a small number of common features - block layout and uniformity of the main power equipment.

FEATURES OF INFORMATION AND ITS EFFECTIVE USE IN INTEGRATION AUTOMATED CONTROL SYSTEM

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One of the most characteristic features of the development of the energy industry is the outstripping growth of the so-called "information load" of the ACS energy system (ES) in comparison with the increase in unit capacities of TPP power units and. especially nuclear power plants.

If we introduce the concept of a specific indicator of "information load" per 1 MW of installed power units inf/MW, then over the period under review it has increased several times. It can be stated that with the use of computer technology in the ACS ES, a new stage of their construction and development has begun. Significant potential capabilities of ACS ES make it possible to cover and control a huge "information field" in terms of the flow of various information flows. Therefore, today we can justifiably speak of "information monitoring", investing in this concept the implementation of the function of the ACS ES for the collection, processing and optimal use of information flows circulating in this "information field".

Under these conditions, the determining role in ensuring the effective functioning of the automated control system of a power unit belongs to its information support (IS) - a set of decisions on the volume, placement and forms of organization of information circulating in the automated control system during its operation.

The modern concept of managing the power unit of TPPs and NPPs is based on centralized control and management from the central unit control panel (BCR). To present information, the information-computing system (ICS) is divided into subsystems, each of which serves the corresponding part of the power unit (steam generator, reactor, turbine, electric generator, etc.). This subsystem includes terminals for communication with an object (USO) and central nodes for collecting and processing information (computer systems (VKO). When TSO is directly connected to the VKO, two levels of the information processing hierarchy are formed corresponding to the information-algorithmic structure of the APCS by the power unit.

INCREASING THE EFFICIENCY OF AUTOMATED CONTROL SYSTEMS OF A LOW-POTENTIAL COMPLEX OF POWER PLANTS

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Introduction. Most of the scientific research in the field of energy saving at thermal power plants and nuclear power plants is aimed at increasing the efficiency of the main energy equipment - nuclear reactors, steam generators, turbo-generator plants, etc. At the same time, there are significant reserves of energy saving in the equipment of the power units' own needs. One of the directions in terms of energy saving is the reduction of energy losses for the own needs of power plants.

To date, the reserves for increasing the efficiency of steam turbine power plants due to the increase of initial parameters, improvement of systems of regenerative heating of feed water and intermediate superheating of steam [1] have been practically exhausted. In this regard, in the energy sector, a lot of attention has been paid to low-potential complexes (NPK) of power plants as structural units of power units, which directly affect the economy of their operation due to the influence on the final parameters of steam and on the consumption of electricity for own needs. According to data from the Zaporizhzhya NPP, underproduction of electricity due to poor heat exchange conditions in condensers annually amounts to about 1.5 billion kWh [2].

Therefore, ensuring the optimal operating modes of NPC systems, reducing energy losses in them is an important and urgent scientific and technical task.

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