SIMULATION OF RATIONAL SPEED LIMIT OF TECHNOLOGICAL PROCESSES

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Rising energy prices and limited opportunities to increase capacities of the power plants have caused growing problem of rationalizing consumption. Hence the urgency is energy efficiency as the cheapest and safest way to increase power generation capacity, it is well known that the cost of 1 kW of power saving 4 - 5 times cheaper than the cost of 1 kW innovation capacity.

Analysis of the Problem Management process indicates that the implementation of energy-saving high-speed modes of operation necessary to determine the optimal electric power, which could provide the necessary performance depending on the process parameters.

To study and evaluation processes of high-speed mode, the range of which is affected by random factors, it is reasonable to use simulation, which provides a formal description of the logic operation of the object and the interaction of its parts over time, taking into account the most significant cause-effect relationships.

The purpose of research - definition of rational modes of high-speed electric drive technology equipment by means of simulation, which will help to increase the energy efficiency of electro-technological systems.

Materials and methods research. The main ways of ensuring sustainable modes of high-speed asynchronous motors are:

1) reduction of energy losses in the performance of electric drive manufacturing operations, given tahohramamy for continuous mode with slowly varying load;

2) change process through the transition to more advanced methods of controllers and parameters of the process.

To realize these objectives it is expedient in an integrated approach to solving

the problem of improving motor control algorithms, methods of selection of engine power and the use of specialized software and hardware, providing the minimization of energy losses in electric.

The main tool that provides research process to address these problems in a complex simulation is that, unlike the analytical method does not require uniqueness computational procedure for obtaining the exact solution of the equations. A simulation approach allows to reproduce the algorithm of the investigated object over time at various combinations of the parameters of the system and the environment. This is particularly important in the analysis of the functioning of processes, where the relationship of biological and technical parameters.

Results. Development of simulation models of rational modes of electric drive requires identification of the object and adapt the control system parameters, taking into account requirements of invariance and robustness of electromechanical systems and power relative to parametric perturbations.

Such models should be defined fully, as measured versatile ability to describe the object hierarchy, ie, the ability to sequential, algorithmic definition of patterns and characteristics of his behavior; completeness; high performance and reliability. Also, because it is important to estimate the behavior of the process under study in a particular situation, it is necessary visual representation of the current settings with the possibility of correction, without waiting for completion of the current model experiment. The implementation of this is possible, particularly by means of tools Simulink, which is integrated in the environment Matlab.

Since the main objective to improve the energy efficiency of the process is rational calculation speed electric mode, determining subsystem simulation model of electro-technological complex should be a module that contains blocks of frequency converter and induction motor.

However, the building blocks contained in the library of Simulink, as a rule, do not allow to implement fully the processes occurring in the above modules, and need to be adapted to the particular engine type and characteristics of the process. In addition, speed control, are based on passport data engines and rigid structure of the

regulator, in practice exhibit instability in work overshoot speed slower it set vibrational modes. These factors directly affect the production process as a whole, the performance mechanisms and so on.

Improve quality regulation system, its energy efficiency can be achieved by the use of adaptive control methods and fuzzy logic methods to analyze changes in system parameters. Algorithms of control action that is under way adaptive frequency induction motor control module implemented accordingly CalcBlock, which is a simulation model of the frequency converter.

Connect model variable frequency drives to subsystems that reflect functional relationships that characterize other objects belonging to the electro-technological complex processes and their mutual influence parameters developed system allows you to bring to the real conditions of operation and allows on this estimate its performance.

An example of this is the system for determining speed mode active aeration of grain. The model is processed information on temperature, humidity and air grain and grain rate of infection with certain discrete in time. Also, using separate subsystems determine the equilibrium moisture content of grain and ventilation mode is selected in accordance with the values of self-warming and contamination detectors on which is installed fan capacity is needed in view of head loss that occurs due to the resistance of the grain layer.

Since the air supply fan functionally dependent on stochastic processes occurring in the grain embankment and in the environment, then implement the scheme would be best to manage the predictive data retrieval. Formation of implemented by cascading method using neural controller and adaptive systems.

Thus, the developed simulation model definition high-speed mode active ventilation allows to analyze dependencies productivity fan of stochastic changes occurring in the grain bulk, and algorithms optimize control system for energy saving process.

Unlike active aeration process, which must take into account a number of factors, but the changes defining characteristics are rather inert, dosing systems

connected briquetting two-component solid biofuels basic technological parameters are only weigh performance and moisture components. But in this case it is important to weigh the consistency of operation and the screw that needs to track changes in the dynamics of high-speed modes of electric drives.

The proposed structure of the simulation model of intelligent system control performance screw-feeder is set based on the value of the stator current induction motor pidpresovuvalnoho screw and, in turn, determines the overall performance of metering, allowing a wide range to adjust the mixture and thus solve problems of excessive humidity straw and reduce the ash content of the final product.

Conclusions

To ensure energy saving electro-technological systems necessary to conduct a comprehensive analysis of the whole process in order to identify factors that affect the growth of energy consumption. Effective means of investigation in this case is simulation.

A module variable frequency drives based on the adaptive control method. Implamentatsiya this subsystem in simulations of electro-technological systems, taking into account their specific operation allows you to dynamically track the defining characteristics to determine the speed of rational modes of electric actuators.

Designed simulation model calculation speed mode active ventilation of grain, implemented using the control system, the operation of which is based on neyroinformatsiynyh technologies. Testing defined modes found that the duration of ventilation grain can be reduced by 15-50 %, depending on the weather conditions and the type of crops and reduced energy consumption by 30 %.

Simulation model developed intelligent system control a connected component dosing biofuels, mean operation error does not exceed 0.2%. Time of the set humidity mixer output, given the delay to clean the developed system, less than 10 s, and overshoot - 2.5 %.