NEURAL CONTROL VENTILATION BIO RAW MATERIALS

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The main purpose of the control system is to maintain ventilation systems, temperature and humidity biosyrovyny not exceeding maximum allowable electricity at the lowest cost. Since the problem of energy-saving modes of electric ventilation unit is multicriteria then realize it may sound management by creating integrated technology process proceedings.

Analysis of the research work in this area indicates that classical methods and model diagnostics of biosyrovyny not provide adequate information about the system. After all processes in the embankment grains are characterized by non-linear behavior, which is typical for other emergency situations (self-warming), they are hard to describe mathematically. In turn, neural networks are able to generate very accurate approximation for complex non-determined non-linear functions of any length. Therefore, in these cases it is necessary to use expert system based on fuzzy logic implementation based on their hardware or software and algorithmic emulyatsiynyh neural networks [3].

The purpose of research - the establishment of efficient energy-saving modes of ventilation biosyrovyny process with the help of neural control through the use of technology.

Materials and methods research. The method of rationalization of operating modes of the control system and increase its efficiency, mobility and flexibility is the use of adaptive algorithms and neural technologies. Therefore, the basis for the design of this type of control is the construction of a knowledge base, submission methods which are based on the principles of systems theory and artificial intelligence. Quantitative measure of the quality system is functioning technological mixed criterion of efficiency, quality indicators biosyrovyny and energy [1].

Results. Energy Technology and ventilation performance management system

depends primarily on the quality control process. Such a system should provide automatic current control parameters of storage and techno-economic performance of ventilation equipment. Only on the basis of full and timely information on these indicators can determine rational energy efficient modes of ventilation systems.

Resalts. Process control systems ventilation should provide the dual interrelated tasks.

1. Analysis of raw materials for the detection of spontaneous heating cells or the presence of pests and identify necessary conditions for ventilation.
2. The choice of mode settings on the active ventilation.

The target function process control active ventilation of grain is to minimize losses of grain, energy consumption at the restrictions its quality product.

The basis of the functional circuit solution of the first problem - diagnosis of the condition biosyrovyny, is an expert system. Operational information from sensors, data on temperature and humidity, the results and the calculated parameters are entered into a database for further use for prediction of spontaneous heating.

Implement an effective system for diagnosis of the condition biosyrovyny failure conditions of measurement data can be based on the use of technology Data Mining - the process of decision support, based on available data in search of hidden patterns. This technology, using the mechanisms of virtual sensors can be installed not only the current temperature, but the overall trend of the temperature gradient in the embankment away from the center of spontaneous heating.

Evaluation of the data using an expert system allows to predict the development of spontaneous heating.

Also, it is reasonable to use hybrid adaptive neural systems (ANFIS) and to meet the challenges the admissibility of ventilation modes and differentiation speed electric fan. Indeed, in these cases, the range of values also are not clearly defined and variable under the influence of various disturbances, which include factors: abiotic - temperature and humidity; technology - changing the fan performance and humidity or temperature of grain; biological - the presence of pests.

Definition of terms of active ventilation is based on module formed by cascading

method and consists of two fuzzy-systems implemented based algorithm Sugeno:

- Subsystem definition of relative humidity, which is based on parametric dependence, which is formed by the psyhrometrychnoyu table:
- Determination of the equilibrium subsystem Moisture is based on data of relative humidity and temperature of the grain.

To set the minimum number of terms that adequately reproduce the range of allowed values of input variables held clustering data distribution. Further testing and verification of trained systems have proven their adequacy, because the mean error was less than 0.35%.

To solve the problem of choice of mode settings on the active ventilation is necessary to define performance ventilation, which depends on the mass of grain mounds, aeration mode selection in accordance with the values of self-warming and contamination detectors and thermal characteristics of the main grain of the culture

Thus it is necessary to conduct the required pressure correction based resistance mound of grain, which used to account for fuzzy-system, the formation of knowledge bases which is based on experimental data for the studied crops (canola, wheat, corn). Performance ventilation set Q, according to the analysis of the rules venting shows that the range of values rather fuzzy and blurred. This confirms the correctness of the decision on the application of artificial intelligence to determine the optimal performance of the fan. Thus, fuzzy systems implemented by the choice of performance to match ventilation mode and barley.

Thus, the developed control system holds the processing of information from sensors temperature values Moisture and air contamination index and grain at a certain time increments. With individual modules first check the admissibility of ventilation (determining the equilibrium moisture content of grain). Then choose the mode of ventilation in accordance with the values of self-warming and contamination detectors. On this basis, set the fan performance is required in view of head loss that occurs due to the resistance of the grain layer. The signal from the control system is the setpoint frequency regulator for induction motor drive fan.

The main problem of program implementation of algorithms based on fuzzy

logic and neural networks is the need to process large amounts of information in real time. Therefore, to improve performance neyrorehulyatoriv used hardware implementation of algorithms. In such cases, it is reasonable to use microcontrollers that combine analog and digital principle of operation and programmable user-friendly as digital circuits with mazhoruvannyam. These circuits are integrated circuits OMRON FP-3000, TOGAI-Infra Logic F 110 that connect to sensors and actuators.

The effectiveness of the system speed control modes complex active ventilation, which is implemented based microcontroller AT91SAM7XC512 using software developed on the basis we have created algorithms testing confirmed that carried both on the basis of the model, as well as in a production environment. The results of production tests have shown that consumption process ventilation modes at certain speed fan performance decreased by 29%, that is 1/3 less than in an unregulated manner.

Testing determined speed ventilation modes, which are realized using control system found that the duration of ventilation grain can be reduced by 15-50%, depending on the weather conditions and the type of grain, and reduced energy consumption by 30%