EFFECT OF PLANTS SPEED MODE ACTIVE VENTILATION ON BIOLOGICAL PROCESSES IN THE GRAIN MOUND

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The process of processing and storage units in the domestic production are characterized by high energy costs. This figure is higher by an average of 30% compared with other known technology and scientifically based standards.

Technological methods, providing a significant reduction in energy storage are active ventilation. This process does not require sophisticated equipment or large capital investments. It is no accident that on the basis of active ventilation for technologies that are widely used in the processing of high volumes of basic grains in some agro developed countries (in particular - USA, Canada, Australia). Experience in leading industries of these countries shows that at present the efficiency of investments in improvement of automation systems and higher than new equipment.

Therefore, the search for new control algorithms speed ventilation modes currently does not lose its relevance.

The purpose of research is to improve the efficiency of energy efficient speed control system modes of ventilation systems to maintain quality indicators of raw materials

Materials and methods research. Efficient search tool in this case is the simulation of complex processes occurring in the real system, followed by an experimental study of solutions and schemes. The method of rationalizing modes of adaptive control system and increase its efficiency, mobility and flexibility are the use of "smart" SAK, reducing the complexity of software and hardware controllers. Therefore, the basis for the design of this type regulators are constructing knowledge base representation methods 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 of grain and energy.

Results. Analysis of the causes that reduce the quality indicators of raw materials in her possession, proves that most dangerous of spontaneous heating the grain mass.

This is because in the grain bulk, as in a complex biochemical system are constant physical, chemical and biological processes, depending on storage conditions may cause deterioration or even complete damage to materials.

Corn, like any living organism, breathing, and thus lost its mass, the temperature and humidity. Thus, storage creates certain difficulties associated with the loss of mass and deterioration. After all, at any time during storage of grain mass in the temperature range of 15-38 ºC and at a humidity exceeding the optimum, there is a high likelihood of mold, insects and fungi.

Losses caused by insects, can be effectively avoided even when cooled to a temperature below the crop 13 ° C. At low temperatures appropriate insects fall into hibernation or cause damage. However, in the best possible conditions for a temperature and humidity, insects multiply rapidly and its vital functions causing great damage to grain. The use of chemical treatment is undesirable for seed grain, and for food - generally forbidden].

Especially dangerous tipping is flour mite that can transform into a unique stage known as hipopus in which the body shell hardens. With no food or when other adverse conditions ticks can remain in this stage for months. To prevent the increase in the number of pests in corn wet proper temperature below 5 ° C. However, it should be noted that exposure to moderately low temperatures in grain mites produced resistance to low temperatures. This factor should also be taken into account when cooled grain.

So, in terms of environmental safety and energy saving, the most appropriate method of pest control is active cooling grain by aeration.

In the static condition mound of grain extremely slowly takes energy. This is due to the insulating effect of the air in the intermediate spaces between the grains and low contact surface. In this regard, warm grain at low outside air temperature retains heat for a long time. Accordingly, based on the same chilled effect - long stays cold.

The process of ventilation should be controlled not only with respect to temperature and humidity. After all, if dry grain blow cold but moist air, it will

certainly cause damage to process raw materials. In addition, the cooling process, under certain weather conditions, the formation of condensate.

Technology means of active cooling ventilation has many benefits that must be considered in terms of economic efficiency, long-term storage without the risk of lower quality, protection from eating pests and their reproduction, protection against the formation of fungi and their mycotoxins avoid costly and dangerous chemical treatment minimizing losses due to respiration of grain, no need low cost drying, storage capacity for germination, no oxidation corn oil.

Insufficient air exchange in the embankment during storage or in dim its ventilation leads to reduced viability grain with high humidity. To save his seed quality, especially humidity 14-15% more than is necessary to provide aeration process at regular intervals, which depends on the temperature and humidity of the environment.

To reduce the time specific ventilation air supply is often increased to 250 m3 / ton per hour or more, but it is associated with significant electricity consumption and cooling costs. It is therefore necessary to establish such specific air supply, which would provide cooling grain and prevent it from spoiling and losses at minimal costs ventilation.

Structural analysis of the processes occurring in the grain embankment during active ventilation conducted taking into account the totality of characteristics that are essential for effective cooling of grain.

Thus, the problem of energy-efficient modes of electric installation of active ventilation is multicriteria and is adaptive in nature. In fact, according to the concepts of adaptability - a system that provides a reduction in real priori uncertainty, leading to effective management process flow.

For ventilation process control algorithm of the system of automated control. Because 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.

Depending on the desired mode of ventilation by differentiated range of performance fan. Analysis of the data shows that the range of values is not clearly defined. This confirms the correctness of the decision on the application of artificial intelligence to determine the optimal performance of the fan.

In this case, the module is implemented using the apparatus of hybrid networks. As the final value of performance depends on the relationship of several processes, in order to avoid the "curse of dimensionality" used method of forming a cascade system, to determine the equilibrium humidity used fuzzy-system type Sugeno; identification of spontaneous heating - module containing neural network to determine the zones fever; to select the desired performance - fuzzy system type Mamdami. To combine fuzzy systems, neural networks and additional calculations used controller. Check for adequate functioning of the model showed that the model allows to calculate the parameters of the system with an accuracy of 0.3%.

Conclusions

Thus, the active ventilation of grain should consider abiotic environmental factors: humidity and air temperature, due to their impact on biological processes in the grain bulk. To prevent reproduction of mites and other pests and to eliminate the need sufficient rate of spontaneous heating ventilation, taking into account the pressure drop caused by the resistance of the layer of grain.

To increase reliability and improve existing systems active energy saving ventilation necessary to carry out a comprehensive analysis of the whole process in order to identify factors that affect the growth of energy consumption.

Since the problem of energy-saving modes of electric installation of active ventilation is multicriteria and is adaptive in nature, realize optimum process control active ventilation possible through the creation of integrated technology process proceeding through the use of intelligent system of automated control systems.