

MODELING OF DISPENSING COMPONENTS OF MIXTURES IN SOLID BIOFUEL TECHNOLOGIES

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The main functions of process control dispensing of components in the production line of two-component solid biofuels is to provide the necessary and appropriate moisture mixture mass ratio of the components. In the technology associated with the use of solid biofuels for thermal energy (heat generator) - ensuring the necessary supply amount of fuel and air to obtain stoichiometric fuel mixture. In the first and second case, this is done by automatically adjusting performance metering and mixing fan air injection depending on the input and output parameters of the technology.

Therefore, the development of effective structures and algorithms dosing process management components in mixtures solid fuel technologies to ensure their full commodity and thermal performance and reduce the unit cost of electricity is an urgent task for Ukraine renewable energy.

In the context of the use of said application package with a set of MATLAB Simulink simulation modeling significantly increases the effectiveness of a comprehensive study of complex electromechanical systems.

The study aims to study and develop factual preconditions for the creation of process control dispensing of components in mixtures solid fuel technologies by imitating mathematical modeling.

Materials and methods of research. In the current domestic and foreign technology production lines for the production of solid biofuels are important common drawback - high energy process and low quality of the final product associated with the inability to mechanical methods to smooth the flow of material non-determined characteristics. Another significant disadvantage of these technologies is the impossibility of forming pellets quality biofuels from raw materials with critical humidity over 16 %.

In addition to the technologies associated with the use of solid biofuels for

heat, particularly bioteplogenerator necessary to ensure effective biofuel combustion-air mixture during its combustion, which can not be achieved by conventional methods of regulation performance metering of fuel and air.

Results. The results of our trial production lines for the production of solid biofuels allowed to formulate the basic requirements for their modernization in order to reduce energy consumption and improve thermal characteristics of biofuels.

It was established that the total moisture content w mixture of raw materials in a silo-mixer, which comes to the press, should be 12 – 16 %, and the ratio of the mass of particles of dry ingredients (chopped straw and corn cobs) it accordingly - 1: 1 - 1: 5. To ensure the above conditions the dosage of each component of biofuel in the required ratio shall be financed by means of frequency-controlled asynchronous electric drive.

To simulate neurocontroller used machine hybrid networks is made based on the algorithm of Sugeno set of heuristic rules that were based on the results of numerical and physical modeling. It is possible to solve the problem of synthesis of control actions based on the use of fuzzy logic and fuzzy sets theory as dependencies on moisture metering performance components.

On the basis of the above research results developed simulation model facilities for the production of two-component solid biofuels using neurocontroller to implement process control.

According to the simulation results set the velocity to the working of dosing, dispersion performance and moisture mixture at fixed humidity crushed corn cobs and 12 % chopped straw changes in humidity within 15-35 % without correction and with correction rate of dispensers working on current performance.

Next simulation model created for the analysis of control modes of heating generators installations for solid biofuel. She plays the modes of operation of electric screw feeder and fan in the process of giving of fuel and air in the required ratios that provide stoichiometric mixture considering the power output of the heat generator.

The resulting curves transients functioning heating generators settings when changing heat load object of consumption.

Further settings fuzzy-regulators for control specified process comes down to the selection of the type and terms of mutual accommodation ranges Input and output variables as well as the correction necessary rules linking the input and output parameters.

Testing control system proved the correctness of the fuzzy controller blocks within the established models. Proof of this is the analysis of transients operation of intelligent systems connected batching mixtures based neurocontroller.

Conclusions

The results of simulation mathematical modeling of batching mixtures in solid biofuel technologies obtained depending on the quantities dispersion performance metering and humidity mix without correction and with correction speeds job of metering, allowing to define speed ranges of electric and develop algorithms manage based neurocontroller and fuzzy logic the use of which in the production line makes it possible to expand the humidity range of basic raw material (straw) to 35%, and heating generators units - to provide stoichiometric fuel mixture.