СЕКЦІЯ 3. «ДЕРЕВООБРОБЛЮВАЛЬНІ ТЕХНОЛОГІЇ ТА СИСТЕМОТЕХНІКА ЛІСОВОГО КОМПЛЕКСУ»

WAYS OF REDUCING HEAT ENERGY EXPENDITURES FOR THE PROCESSES OF MIXING AND EXTRUSION OF BRIQUETTE MIXTURES

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Processing of the local wood and plant waste into solid fuel is an attractive method. The economic expediency of the choice of waste is based on the fact that cheap, mostly non-liquid waste is used, the volumes of which are generated on the territory of Ukraine are significant. Briquette production technology involves the implementation of such technological processes as grinding of bio-raw materials, drying, briquetting, cooling, packaging. Briquettes are made of various shapes, which in most cases have simple configurations, from various vegetable raw materials, but this production is energy-consuming and of insufficient quality. Our energy audit of this technology showed that the largest energy costs are spent on drying.

Electromagnetic drying technology is increasingly finding its way place in the processes of drying and thermal treatment of materials, in particular in combination with convective heating with hot air, infrared radiation and other less common methods of moisture removal.

The basis of scientific research is the change of approaches to briquetting and the improvement of technological schemes and solid fuel production processes. The scheme of the briquetting process in a simplified form consists of operations: grinding, mixing, pressing and microwave drying. For the implementation of the specified technological scheme, a research and industrial facility was created, which provides all the necessary cycles of the technological regulation of fuel production. A number of scientific experiments were performed, which made it possible to identify regularities and subsequently create an installation.

Here it is important to estimate the minimum amount of water needed to ensure the process of creating gel-like structures for maximum plasticization of biopolymers. The process of compacting biomass with an auger mechanism takes place in three stages. At the first stage, when the raw material enters the working zone of the auger, stresses arise that lead to deformation of the biomass, and the increase in deformation is not proportional to the increase in stress, which indicates the non-linear nature of the process of this system. At the

second stage, the increasing load leads to a critical combination of stresses, in which a limit equilibrium is established between the internal resistance forces of the biomass and the external load, which is called the limit stress state - part of the water is squeezed out of the raw material. At the third stage, a further, even slight, increase in load leads to the development of plastic deformations. Harder particles are pressed into more plastic ones. In order to reduce the duration and energy consumption of drying, we suggest drying in a vacuum, while thermal energy is supplied to the product with the help of an ultra-high frequency electromagnetic field. The resulting distribution of the temperature field across the cross-section of the briquette meets the requirements of the technological process and creates conditions for optimizing these procedures.