

# YASHIL

## IQTISODIYOT va TARAQQIYOT

Ijtimoiy, iqtisodiy, texnologik, ilmiy, ommabop jurnal



### ZAMONAVIY IQTISODIYOTDA YUQORI MUHANDISLIK TEKNOLOGIYALARINI ILMIY-AMALIY JORIY ETISH INNOVATSION TARAQQIYOT POYDEVORI

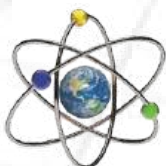
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# **“ZAMONAVIY IQTISODIYOTDA YUQORI MUHANDISLIK TEXNOLODIYALARINI ILMIY-AMALIY JORIY ETISH INNOVATSION TARAQQIYOT POYDEVORI”**

***MAVZUSIDAGI ILMIY MAQOLALAR TO‘PLAMI***





# SYSTEMATIC ANALYSIS OF BRIQUETTE MASS PRESSING EQUIPMENT APPROACH

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**Abstract:** Nowadays, the need for solid fuel products in our Republic is increasing day by day. Mathematical and computer models describing the process of pressing briquettes were developed, and as a result of conducting analytical experiments, graphs of the dependence of the density, porosity and volume of briquette plastic mass on the duration of pressing were obtained.

**Key words:** systematic analysis, input and output parameters, mathematical modeling, hierarchical structure, compression part, briquette forming part, compression ratio, analytical experimental way.

**Annotatsiya:** Hozirgi kunda Respublikamizda qattiq yoqilg'i mahsulotlariga bo'lgan ehtiyoj kundan-kunga ortib bormoqda. Briketlarni presslash jarayonini tavsiflovchi matematik va kompyuter modellari ishlab chiqilib, analitik tajribalar o'tkazish natijasida briket plastmassa massasining zichligi, g'ovakligi va hajmining presslash davomiyligiga bog'liqligi grafiklari olingan.

**Kalit so'zlar:** tizimli tahlil, kirish va chiqish parametrlari, matematik modelashtirish, ierarxik tuzilish, siqish qismi, briket hosil qiluvchi qism, siqish nisbati, analitik eksperimental usul.

**Аннотация:** В настоящее время потребность в твердотопливных продуктах в нашей Республике увеличивается с каждым днем. Разработаны математические и компьютерные модели, описывающие процесс прессования брикетов, и в результате проведения аналитических экспериментов получены графики зависимости плотности, пористости и объема пластической массы брикета от продолжительности прессования.

**Ключевые слова:** системный анализ, входные и выходные параметры, математическое моделирование, иерархическая структура, часть прессования, часть формирования брикета, степень прессования, аналитический экспериментальный способ.

## INTRODUCTION

A systematic approach to the study of briquette mass pressing equipment and the current state of the pressing process allows to obtain the most accurate results and to correctly assess the possibilities of increasing the level of raw material utilization and reducing energy consumption in production [1; 160-p. 2.]

On the basis of systematic analysis, many processes are studied and optimal options for carrying out processes are developed. For example, if we take the production of vegetable oil [3; 4; 69-72-p.], a multi-level hierarchical structure of the systematic analysis of the pressing process in the production of vegetable oil is developed. In addition, each level of the hierarchy covers elements - quasi-devices and processes in them.

## RESEARCH METHODOLOGY

In researching the technological system and apparatus for making briquettes on the basis of small fractions of coal [5.], initially the parameters - the input and output parameters of the system - the pressing apparatus consisting of the system and the process taking place in the system are determined. Next, the considered system is divided into constituent elements, the parameters for each selected element - quasi-apparatus - are shown.

A systematic analysis of the briquette pressing device is considered together with the selected process taking place in it, its parameters and initial considerations of their interaction are determined.

According to the proposed method [1; 160-p. 2.], initial indicators - input and output parameters of the briquette material pressing facility are determined. After that, the considered system of briquette mass pressing in a pressing device (element) is divided into constituent elements, the parameters for each selected element and

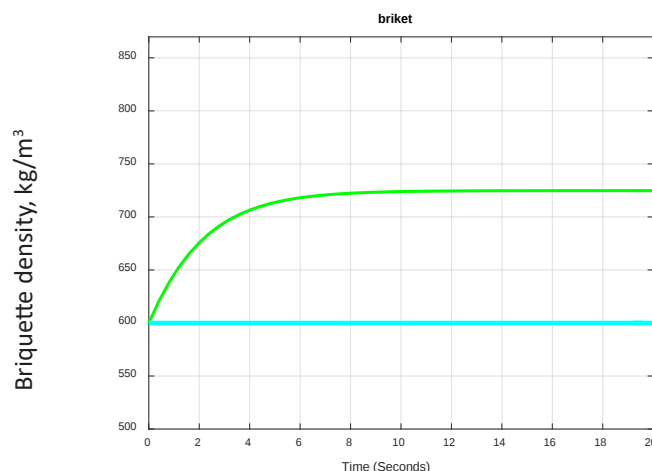


the process in the element are indicated. And in this case, the division of the element (system) into subsequent systems is not limited. The decision is made according to the level of necessity and the possibility of research, that is, to ensure optimal pressing of the material to obtain briquettes in the pressing device.

## RESEARCH RESULTS

At the first level of the hierarchy, a semi-industrial apparatus for pressing briquette material is considered. Continuing the systematic thinking [7; 185-p.], in this work, the briquette material pressing device comes to the fore, its input and output parameters are determined. The input parameters of the briquetting material pressing object are the consumption of material for briquetting  $G_{input}$  (in which a certain ratio of constituent components is taken into account) and the energy spent on the process  $N$  is taken. The consumption  $G$  of the outgoing briquette material and its density are taken as output parameters. When calculating the volume of material from which briquettes are obtained in a quasi-pressing device, the material pressing coefficient  $k$  ( $\text{kg}/\text{m}^3 \cdot \text{s}$ ) is taken into account [6; 142-143-p.]

Based on mathematical modeling, the results of briquette density and its relative porosity indicators are presented in Figures 1 and 2.



Pressing duration  $\tau=20$  min

Figure 1. Variation of briquette density during pressing.

Figure 1 shows the change in the starting characteristic of the pressing device, which describes the change of the starting characteristic of the briquette density with time, where the pressing coefficient is  $7100 \text{ kg}/\text{m}^3 \cdot \text{s}$ .

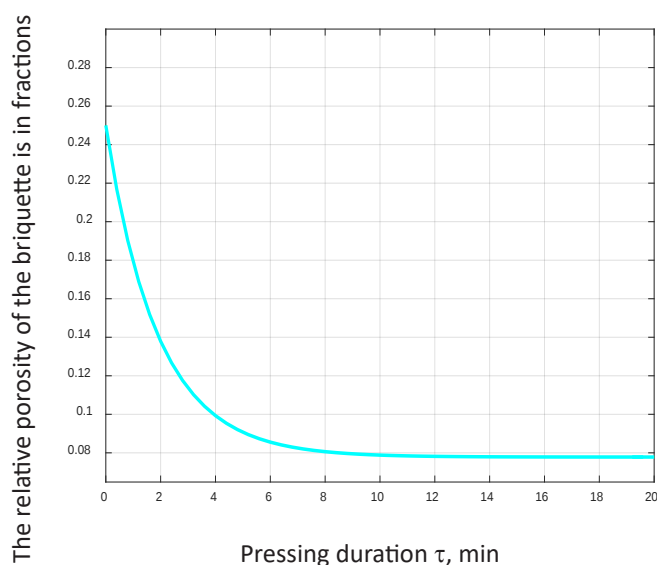


Figure 2. Variation of relative porosity of briquettes during pressing.



Figure 2 shows the curve of the relative reduction of pores in the briquette during pressing of coal briquettes.

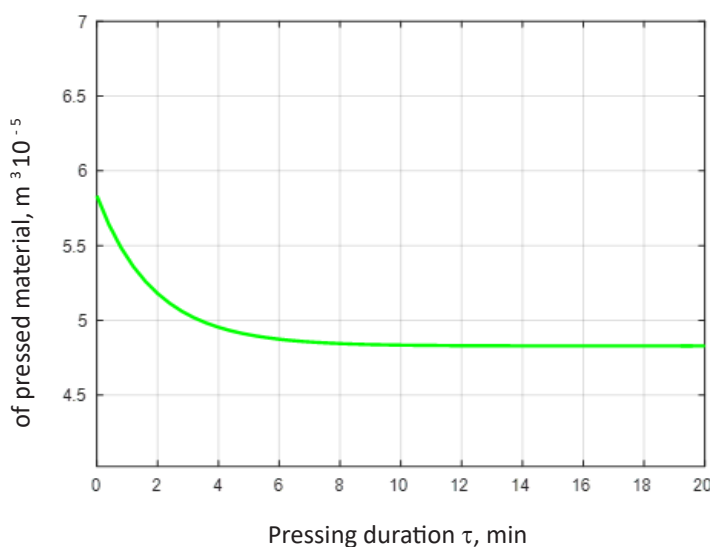


Figure 3. Dependence of the volume of pressed material on the duration of pressing.

Figure 3 shows that the density of briquettes increases from  $600 \text{ kg/m}^3$  to  $725 \text{ kg/m}^3$  when the pressing coefficient  $k$  is equal to  $10,000 \text{ kg/m}^3 \cdot \text{s}$ . It can also be observed that during pressing, the relative change of material porosity decreased from 26% to 8% (Fig. 2).

The results obtained on the basis of mathematical modeling show that by implementing the operating mode of the system developed for the coal briquette pressing process in a stable state, it is possible to maintain the volume consumption of the product at a uniform rate within a unit of time.

From the second level of the hierarchy, the material pressing apparatus is considered in the form, where one of the abstract indicators is the material compression coefficient.

At the third and fourth level of the hierarchy are the press housing and the screw and the material transferred to the body is considered. In this case, calculate the dimensions of a certain body and how much pressure it will work at can be determined. The material is gradually compacted in the body with the help of an auger and comes out in the form of briquettes. The material can be divided into two parts: first compression part, the second briquette forming part. When the material enters the forming part, it is formed and leaves the apparatus. The compression part is the main part. This is served by the consumption of the product, its density and porosity as an input parameter. If the output parameter is the consumption of the output product, it is its concentration by density. Here, energy is given under pressure the gap in compression changing concentration has its own complexity. That is, the density of the product gradually increases until it is finally formed by briquette press. If we specify the input and output parameters, the output product will take a certain form through the forming device. Here is the consumption and porosity of the product, the consumption and porosity of the outgoing briquette. All of these together form a larger system and process. Then there are things that can affect the compression of this product. In the compression part, it is compressed by mixing coal, binder and liquid material together and the parameters keep changing until the process is completed and the density of the material increases. Compression and shaping if we look at the process in the section, how much the density of the product composition increases is of great importance for briquetting. We will see many steps of mathematical modeling with an analytical experimental approach. That's why a systematic analysis of the device is done first, its approximation is studied and a mathematical model of the required process is created. Based on this, a computer model is created. This will allow you to calculate the process.

## CONCLUSION

When we use mathematical modeling in an analytical experiment, we use material balance equations. And in the material balance equation, we can see the concentration of compression, that is, the concentration of increasing density. Considering this in various situations, we can calculate the compression coefficient, which is more complicated. We will try to find the compression coefficient experimentally. Therefore, we can find the compression coefficient in our fire experiments and create a computer model based on it.



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