УДК 621.926.4

ANALYSIS OF TECHNOLOGICAL PARAMETERS OF A CENTRIFUGAL IMPACT CRUSHER IN THE PRODUCTION OF RDF-FUEL

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Summary. *The article describes the relevance of switching to an alternative energy source, and also examines the behavior of a polymer material in an innovative shock-centrifugal type installation in order to obtain RDF fuel.*

Currently, there is a growing trend in energy consumption in the world, characterized by rapid development of digital technologies and global demand.

Technologies and standards for the production of alternative fuels are currently being developed. One of the rapidly developing types of alternative fuels is RDF fuel. This type of fuel solves problems with an ever-increasing amount of waste and with an increase in energy consumption. The presence of polymers in the RDF fuel poses the task of grinding them. Unlike mineral raw materials, which are broken down into a smaller fraction upon impact, half-measures have the properties of stretching upon impact.

The grinding of the material occurs due to collision with a flexible element mounted on a rotating rotor. Due to the high rotation speed of the flexible element upon collision with pieces of the source material and a flexible element, the bonds between the crystals are broken and their destruction occurs. Such grinders are known and have shown their high efficiency in grinding a wide range of materials [1].

In the course of the study, an experiment was conducted on the grinding of polymer material. The experiment was carried out on a material with a size from 150 to 300 mm with a thickness from 30 to 200 microns at a rotor rotation of 800 rpm.

The result of grinding was the production of a finished product with a size from 2 to 30 mm with a pronounced ragged trace. Figures 1 and 2 show the material before and after the experiment.

Figure 1 – Material before grinding

Figure 2 – Material after grinding

The experimental part determined the initial conditions for computer modeling in the SolidWorks Flow Simulator program. Based on the results of computer modeling [2], plans for the movement of air flows and velocity changes in a centrifugal impact crusher were obtained (figure 3)

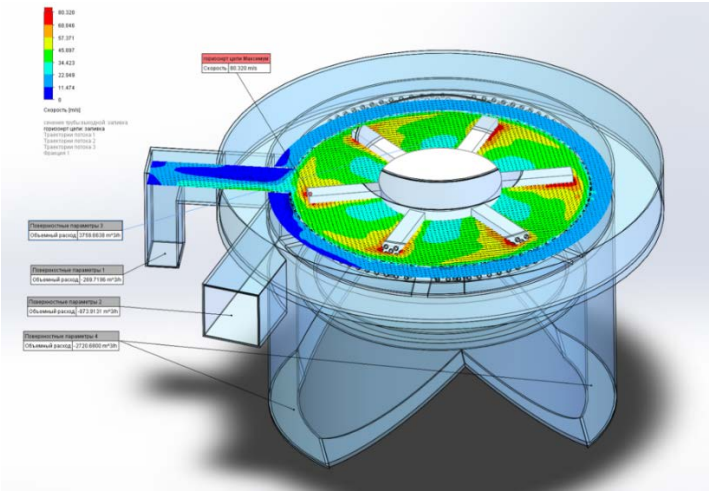

Figure 3 – Air flow movement and velocity changes in a centrifugal impact crusher

Figure 3 shows that the particle velocities increase as they move from the center of the rotor to the periphery. At the same time, when moving in the unloading elements, they begin to fall, which is associated with significant hydraulic resistance in these zones.

Computer modeling also confirmed that the air flows created by the rotation of the flexible elements of the centrifugal impact crusher form a low-pressure zone located in the central part. Consequently, the finished product may linger in the grinding area. This is a negative effect and contradicts the principles of rational organization of the grinding process [1].

Thus, the conducted research has established the possibility of using a centrifugal impact crusher for grinding polymer materials.

In addition, they made it possible to study the behavior of polymer materials during crushing by impact and optimize the design and technological parameters of these grinders.

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