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Research of state-of-the-art issues of drying fine materials

The development of the mode and method of drying any object, as well as the design of a drying plant, implementing these modes and methods, begins with a comprehensive study of the properties of the drying object and the laws of changing them at all stages of processing raw materials into the target product.

The main technological indicators of the processes of minerals processing are the output and quality of products, the extraction of useful components, the efficiency of enrichment. Methods of drying materials are divided into mechanical and thermal. The mechanical methods include: suction, filtering, centrifugation, etc. Mechanical methods for changing the pressure are possible only if the drying materials allow for some kind of deformation. The disadvantage is the low final moisture content of the product. Thermal methods of moisture removal have become the most widespread. They are also divided into natural and artificial ones. The disadvantages of natural drying in comparison with artificial ones include: long duration, high dependence of intensity and ultimate humidity on external climatic conditions; for the placement of material, large areas and a complex logistics system are needed.

The choice of drying plants design depends on many factors, namely: on the material properties, the requirements for the dried material, the technological modes of drying, the type of drying agent and its parameters, the method of supplying heat, the coolant type, the installation compactness, the conditions of its service and others.

Let's isolate the way of drying dispersed materials with the help of an electric current, where the electric current is passed directly through a layer of a wet material.

The method allows the drying of moist materials, for example, non-ferrous metallurgical slags and their enrichment products, with a low energy consumption (0.8 to 1.0 kWh per kilogram of distant moisture) [2].

To sum up, the method can be used in various fields of technology, mainly in the mining and chemical and metallurgical industries, for drying such loose materials that are in the wet state as conductors of electric current, that is, they contain electrolyte moisture, or they themselves are conductors of electric current. The

advantage is the prospect of developing a drying method with no environmental contamination [1].

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Analysis of generators for wind farm

Ukraine is one of the most energy intensive countries in the world [1]. One of the most affordable sources of renewable energy is wind power. After hydropower, it is wind energy that leads the way among alternative energy sources in terms of installed capacity and the amount of energy generated. The best wind resources in Ukraine are in the Carpathians, southern coast of Ukraine, Donbass region, and windy areas in Central Ukraine.

The main problem faced by wind power is generation of electricity of the required quality [2]. The fact is that the wind is characterized by a constant change in speed and direction, and this directly affects the parameters of the generated energy – amplitude and frequency. The quality of electrical energy is subject to rigorous the standardization. As a result, the wind turbine generators should be able to maintain strictly set parameters of the generated energy at any wind effect. This problem is solved by means of the system of stabilization of the output energy, created specially for each type of generator. Accordingly, the most important issue when creating a wind turbine is the choice of a generator type.

A serious argument is needed for choosing the type of generator, because the choice will require significant material investments in the organization of their production: scientific developments, creation of new technological processes and equipment, test benches, training of engineering and technical personnel and workers.

Traditionally, one can distinguish the following types of generators [3] used in wind turbines:

- 1) induction generators with short-circuited rotor;
- 2) synchronous generators with electromagnetic excitation;
- 3) asynchronized synchronous generators;
- 4) induction generators with phase rotor;
- 5) doubly-fed induction generator;