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FACTORS INFLUENCING THE FORMATION AND MAGNITUDE OF PHYSICAL AND MECHANICAL PROPERTIES OF COMPOSITE WOOD-PLASTIC MATERIALS AND BOARDS

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ABSTRACT

Taking into account that in this work the technology for the manufacture of composite wood-plastic materials and boards from cotton stalks is based on the principle used in the production of chipboards, information on chipboard was used in the analysis of technological factors

1. Factors influencing the formation of physical and mechanical properties of composite wood-plastic board materials were divided into three groups:

1. Factors characterizing the filler:
   - structure and properties of cotton stalks,
   - structures in chip mass from cotton stalks,
   - particle size and fractional composition of the chip mass
2. Factors characterizing the technological process:
   - moisture content of the filler before and after resining,
   - the amount of binder,
   - slab construction,
   - slab density,
   - Pressing mode.

Since, in contrast to the well-known and well-studied technologies of particle boards, in this work an unconventional material of cotton stalk was used, when determining the factors that need to be studied, we proceeded from this premise. The circumstance changes the properties of the filler.

In addition, from the analysis of the studies carried out so far, it is known that it was the individual features of the filler from cotton stalks that were not paid attention to in the development of the technology of composite wood-plastic boards from cotton stalks.

Therefore, we have studied the structure and properties of cotton stalks Fractional composition of the crushed mass and geometry of particles, flowability, volatility, bulk density of shavings from guza-pai, etc

2. Permanent factors. Some factors have been taken as conditionally constant, mainly factors that are not related to the properties of the filler, such as the design of the board, the type of binder, the mode of pressing.

Slab construction. In a multilayer slab, larger particles are placed in the middle of the package, and the outer layers are made up in smaller ones.

An increase in the polymer binder content in the outer layers intensifies the transfer of heat and energy to the middle of the slab due to the moisture and pressure gradients that occur in the slab during compression.

A single-layer board has more uniform properties in terms of volume, as the particle size and binder content are the same in all directions.

This makes it possible to obtain a more uniform density over the thickness, and therefore a higher tensile strength perpendicular to the layer.

Taking into account that the difference in particle size in the crushed guza-pai is large, a multi-layer slab design was adopted in the present study.

Type of binder.In the production of particle boards, urea-formaldehyde resins are mainly used. They are colorless and odorless.

Pressing mode. It is known that the temperature, time and pressure of pressing have a significant impact on the properties of the boards, however, the purpose of this work was not to study the pressing process in the aspect of a wide range of chemical and thermophysical phenomena accompanying it.

3. Variable factors.The analysis of the influence of factors and their location according to the degree of impact on the physical and mechanical properties of composite wood-plastic boards was carried out in the work.

Binder quantity. The bonding strength of the filler particles depends on the formation of an adhesive joint between them, in which there should be no significant internal stresses caused by the shrinkage of the glue. to a decrease in the physical and mechanical properties of the panel material.

In the production of chipboard, when using urea-formaldehyde adhesives, it is recommended to add at least 4-3% of binder to the chip mass.

For example, cotton stalks contain about 33% of bast bark, which after grinding has a greater adsorption capacity compared to wood.

Slab density. The analysis of literature sources and the results of experimental studies shows that density has a decisive influence on the physical and mechanical properties of composite plates.

Since it is not possible to obtain slabs with a constant density during the experiment, it is necessary to take into account its density when evaluating the quality of each sample.

An increase in density leads to a decrease in voids in the slab, which gives it high strength properties and water resistance.

The density of the board varies depending on the density of the filler material. The densest are coniferous wood slabs, which have a high specific gravity.

Fractional composition of the filler. This indicator is characterized in this work by the content of fibrous inclusions in the crushed mass, obtained from bast bark during grinding of wood particles, and dust-like particles formed from the stem core. In addition, the concept of fractional composition includes the results of sieve analysis of the crushed mass, which divided it into several parts according to the size of the particles.

The influence of fibrous inclusions is obvious, since theoretically the fibers should play the role of a reinforcing and connecting element. At the same time, they require a change in the modes of resinization and pressing of the material and have a great impact on its properties.

The same can be said for wood and dust particles: determining the optimal fraction ratio should be an integral part of research.

The particle size of the filler is very important in the creation of a composite material. The quality of the chips is determined by the content of the particles in it that are conditioned in size. Determining the optimal size of the filler is also important when setting the grinding mode for cotton stalks.

Chip moisture before and after resining. The moisture content of the chips before resinization is formed from the natural moisture content of the cotton stalks and has an effect on the resinization process. It is known that the more moisture the wood cells are, the less they absorb the resin, it remains on the surface of the particle, and a continuous layer of glue is created there. However, an overabundance of moisture causes the board to delaminate after the pressure is relieved during pressing.

The moisture content of the strand carpet after tarring includes the natural vein chips and the water contained in the binder. The amount of moisture and its distribution over the thickness of the formed carpet has a strong impact on the properties of the finished slab. Lack of moisture leads to a decrease in heat transfer and poor internal particle bonding, an overabundance to the relaxation of the stove due to the high vapor-gas pressure at the time of removal of the press plate.

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