УДК 674.048

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# THE COMPLEX AND RATIONAL USE OF LEAD IS IN PRODUCTION OF JOINER-BUILDING WARES

The article suggests resource-saving method manufacturing joinery products of veneer, giving the opportunity to reduce the consumption of expensive hardwood and valuable species of wood as the surface layer laminated veneer products (plywood) to manufacture parquet products. This method allows to use as raw material-lump veneer, veneer-flaw − waste of plywood production; wood veneer from low-value wood species; wood with low density. The proposed method of manufacture plywood, particularly hardwood veneer products can solve the problem of shortage of wood. It is proposed to design and technology, joinery products, veneer (non-format veneer, veneer flaws and veneers getting from logs).

The method of manufacturing multilayer laminated articles from veneer is promising and has several advantages, which are as high consumer qualities of the products, significant reductions in labor costs and raw materials consumption. It is possible to produce parquet of the product and also wall panels, decorative elements of furniture which significantly reduces the cost and expands the scope of glued laminated products from plywood with minimum cost. Thus, the aim of this work is to expand the range of joinery products from waste products (plywood) with a high aesthetic and performance properties.

**Key words:** resource saving, joinery products, parquet, veneer, plywood, technology, design.

**Introduction.** Currently Republic of Belarus has a great importance in the problem of integrated and rational use of wood. Every year Belarus imported about 2 million $m^3$ of commercial timber. At the same time, the total volume of waste from wood processing and logging enterprises reaches about 2.6 million $m^3$. The resulting deficit can be covered due to more complete utilization of wood-waste, the rational use of low-grade wood, wood of soft deciduous species, increasing the lifetime of a product [1].

The usefulness of a product is determined by a complex of factors: technological, technical, environmental, social etc. Ignoring these factors in creating new types of wood products will inevitably affect the demand and marketability. Therefore, it is evident that the criterion of relevance of the importance becomes crucial for the development of woodworking, including the manufacture of joinery, in particular parquet. Before the woodworking industry seeks constant renewal and expansion of the range of wood products, including the organization of production of high quality parquet products that could successfully compete on the world market. The above said predetermines the necessity of development of new types of joinery from wood, espetially parquet [2−5]. The efficacy of glued laminated veneer lumber is expected to increase significantly during the expansion of the product of range of plywood. Today, every year the Republic of Belarus increases the production of plywood by about 25% in year. In construction and furniture manufacture in general purpose in a large volume uses plywood with outer layers of veneer wood hardwood and softwood. Plywood is used for the manufacture of parts of furniture; for device formwork, equipment for vehicles, interiors, manufacturing of parquet products, etc [6].

Progress in many sectors of the economy depends on the used technology, equipment and materials that makes up the main material culture of the society. High increase in volumes of housing building entails an increase in consumption and therefore production of timber and wood products.

Currently, the main task of the woodworking industry is the rational and integrated use of forest resources. Comprehensive and rational use of wood is conducted at all manufacturing operations at its processing and includes the reduction of waste of wood processing; obtaining the maximum output of the required assortment; reduction of material consumption of wood products; use of waste generated in the manufacturing process of main products, as the main secondary process of raw materials [2−7].

**Main part.** The progressiveness of certain materials for the flooring is not only in production but also in the spheres of consumption and exploitation. The efficiently of interchangeable materials for the flooring should be assessed for the final product taking into account the full costs at all stages of the production and operation of coatings. Replacement of one material for another involves a change in a part or in all of the floor structure, therefore, in assessing the economic importance of different types of materials, it is necessary to compare the material with the material of the floor structure as a whole.

In connection with changes in the market of joinery, in a competitive environment before the woodworking industry seeks constant renewal and expansion of the range of wood products (laminated parquet products, items, furniture, wall panels, etc.), the organization of production of high quality joinery products that meets the needs and opportunities of all

segments of the population, and products that could successfully compete in the world market [2–7].

Developed new design and manufacturing technology of multilayer parquet products (planks, boards) with the veneer, giving the opportunity to reduce the consumption of expensive hardwood and valuable species of wood as the surface layer is laminated parquet products. The need and importance of the development of the parquet veneer products confirmed the main direction of development and modernization of wood processing enterprises.

Existing technologies of the production of multilayer parquet products have some disadvantages. The main of them is the production of strips of facing layer (6 mm thick) by the method of sawing, which reduces the useful output of strips of lumber to 20%. In addition, the bonding to the substrate relative to the narrow strips ( rom 20 mm to 45 mm), with some deviations in thickness, makes it difficult for uniform transmission of pressure on each bar, and in the end, the individual strips are enough firmly glued.

The article deals with the design and technology of parquet boards and boards from veneer (nonformat veneer, veneer flaws and veneers with cylindering logs). Process, which is as follows [3–5]. Made from veneer, veneer flaws and from waste generated during cylindering of log, rectangular pieces of veneer, dried to a moisture content of 6%, one species of wood, the same size in length and width with adhesive, is placed on the pallet to obtain the required layer thickness [3–5].

On this layer the same way to recruit the next layer of veneer of a different wood (or different colors) to create a color (texture) differences of adjacent layers in the shield. In the same manner, the gain and subsequent layers of veneer to obtain the necessary thickness of the package is determined by the ultimate size and pattern of the parquet Board or boards.

Glued plots of veneer in a full length and width of leaves, cut into strips, along the direction of the wood fibers, width, depending on the pattern of the resulting products (e. g., 120, 145, 155, 160, 200 mm thick), characterize the magnitude of the wear layer for abrasion – 4–5 mm. Bonding the veneer in plywood can be made on the basis of modified urea-formaldehyde adhesive, which improves the physico-mechanical and performance properties of the laminated structures (veneer plywood) and products [6].

By changing the width of the strips in the set of the surface layer a wood veneer, the color and the location of the strips in the direction of the wood fibers, it is possible to obtain a wide range of figures, the surface layer of parquet boards [4, 5, 9, 10].

A layer of compacted by the method of rolled veneer (to improve physical and mechanical properties) with adhesive type in a package, taking into account the symmetry of the arrangement of the veneer sheets against the middle of the bag, is loaded into the gaps between the plates of a press, glued on typical technological modes of bonding of plywood (waterproof plywood) [4, 5]. In Fig. 1 shows examples of the constructive schemes of multi-layered parquet boards from veneer [4]. In Fig. 1 shows examples of the constructive schemes of multi-layered parquet boards from veneer [4]. Recruited a pack of dry layers of veneer glued together into a block under pressure and sawn along the grain of the wood (sawing machines) on the plate so that the edges of the veneer was formed by plane plates. The thickness of the plate (plywood plate) is determined by the thickness of the plate (for example, 16 mm plus an allowance for processing). The resulting plate is cut out on the elements of the shield required configuration, for example, as shown in Fig. 1, rectangular, hexagonal parquet panels. Varying the number of layers, their thickness, species or color of wood, and geometric configuration of elements when connected in the shield, can be difficult to obtain different patterns of the parquet board veneer.

In Fig. 2 shows examples of structural diagrams of multilayer parquet boards veneer [5]. Glued sheets of plywood (plywood) with the front layer of veneer (compacted veneer) glued to the rib in the direction of the fibers 1, cut across the grain of the face layer, the cutting line shown by the dotted line 2. Received, therefore, strips (plates) should be treated on the perimeter, with the aim of obtaining the necessary profile for connecting planks to parquet flooring. The front layer has the pattern of the parquet planks. The middle layer 2 can consist of several layers, the lower layer has a thickness equal to the thickness of the face layer, and is identical to the direction of the fibers. Strips of veneer can have a different color or texture of wood. Received, therefore, strips (plates) should be treated on the perimeter, with the aim of obtaining the necessary profile for connecting planks to parquet flooring. The front layer has the pattern of the parquet planks. The middle layer 2 can consist of several layers, the lower layer has a thickness equal to the thickness of the face layer, and is identical to the direction of the fibers. Strips of veneer can have a different color or texture of wood.

It is known that the front coating of parquet products meet high requirements in respect of strength, hardness, wear resistance and decorative properties. Such a effective method, as seal face layer of veneer allows you to get these qualities and low value of wood of soft deciduous species (alder, birch). Densified wood has higher physical-mechanical properties than natural, while in the process of sealing do not apply chemical compositions, and the improvement of properties takes place only under high temperatures and pressure [11–15].

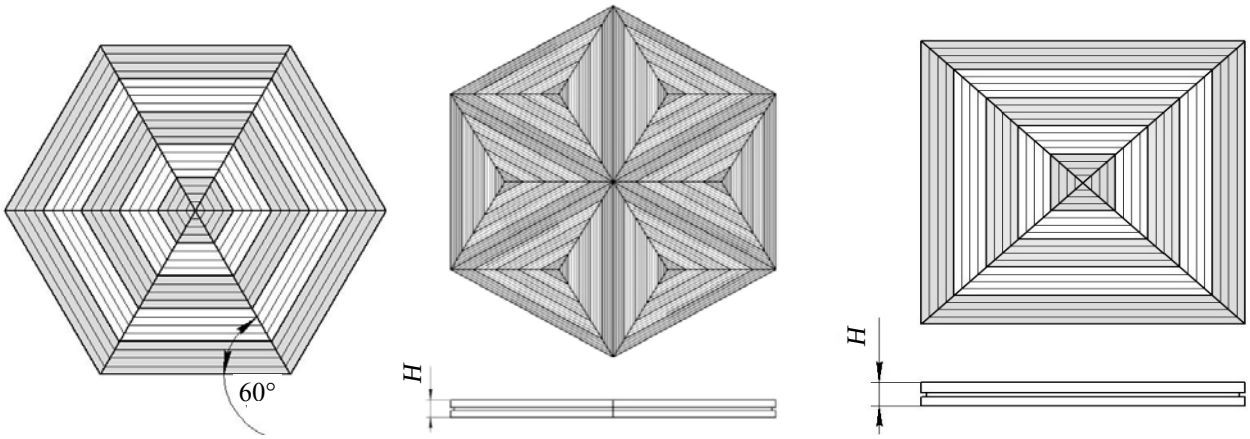


Fig. 1. The schema of the parquet panels of veneer

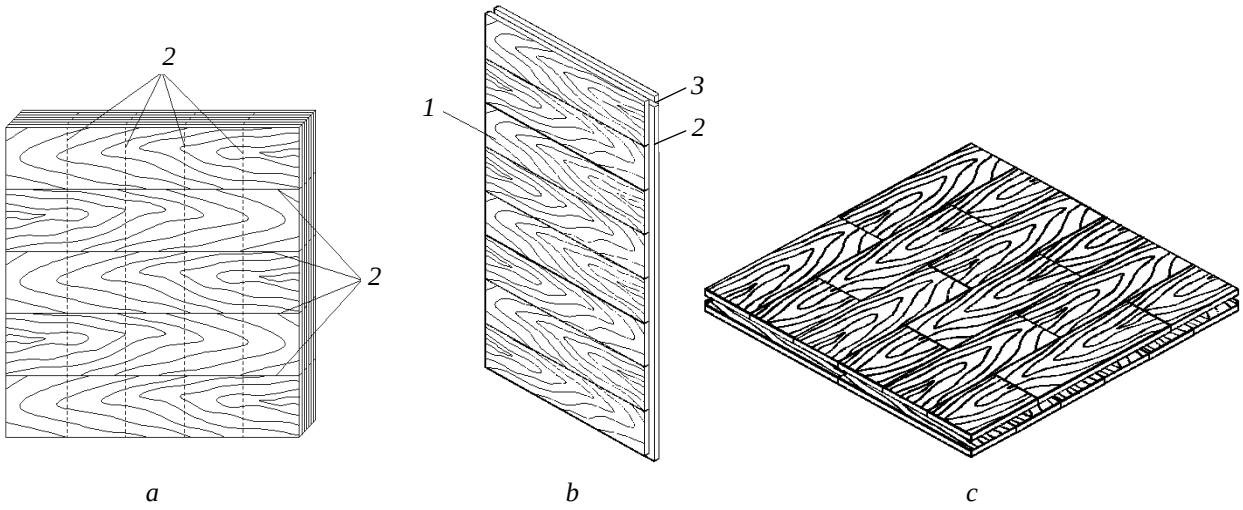


Fig. 2. Structural diagram of multi-layered parquet boards
from veneer, plywood plate with outer layer in strips:
*a* – scheme of production of multilayer parquet boards from veneer
(*1* – the direction of the grain of the wood; *2* – dotted line diagram of the cutting plate to plate);
*b* – scheme of floorboard veneer with the transverse strips of the surface layer
(*1* – the front layer of compacted veneer; *2*, *3* – middle and lower layers of low-grade veneer, respectively);
*c* – a fragment of parquet flooring with a pattern randomly

**Conclusion.** The proposed designs and the technology of multilayer parquet products veneers can be an alternative to the widespread lately, laminated parquet coatings on the basis of fibreboard of dry method of production of high density. A significant drawback, which can be considered a short lifetime (about 5−10 years).

The proposed method of production multilayer parquet veneer is promising and has several advantages, which are as high consumer qualities of the products, significant reductions in labor costs and raw materials consumption. Of plywood with a minimum cost possible to produce parquet of the product, which significantly reduces the cost and expands the scope of glued laminated products. The results of the tests proved that in order to achieve practical results in improving the qualitative indicators of the products of plywood production in the adhesive composition based on urea-formaldehyde resins it is recommended to add a modifier – natural silicat, improving operational performance of products [6]. Natural silicat is an active modifier and greatly improves the performance of the properties of laminated products.

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*Received 17.11.2017*