Application of Directional Structure Wheat Straw Board in Furniture and Interior Decoration

Tiangang Wei

Shaanxi University of Science and Technology, Xi'an, 710021, China

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Abstract: As a huge renewable resource, wheat straw is mainly composed of lignin, cellulose, hemicellulose and some ash impurities. It is very similar to the composition of broad-leaved wood and is a good substitute material for wood. Directional structure wheat straw board (OSSB) has the characteristics of light weight, high strength, good dimensional stability and environmental protection. Its physical and mechanical properties are comparable to those of wood Directional structure wheat straw board. By analyzing the development, characteristics and production process of oriented structure wheat straw board, the feasibility of applying the oriented structure wheat straw board in furniture and interior decoration was analyzed and discussed. According to the market demand, the development strategy of OSSB furniture and decorative materials was determined. The focus of development and its value orientation, and measures to increase the investment in OSSB furniture and accessories. The development of OSSB fully complies with the development trend of ecological environment construction and has broad prospects in the domestic market. Its applications cover wood construction, interior decoration, furniture manufacturing, building formwork, packaging, and many other fields, and the use of wheat straw instead of traditional wood to make plates effectively protects forests and cultivated land.

1. Introduction

The main components of wheat straw are similar to broad-leaved wood, which is one of the important renewable resources to supplement the shortage of wood resources. With the development of China's manufacturing industry, the production technology and equipment of wheat veneer in Northwest Wood-based Panel Machinery Factory were studied [1]. In order to improve the chemical energy of products and expand its application scope, it also provides important data such as technological parameters for the research and production of wheat-rice board, and takes the first step in the in-depth study of wheat-inclusive wood-based panels in China [2]. The main market of OSSB has always been residential buildings, which are used for houses, ceilings, floors, thermal insulation wall panels, roof panels, partition panels, etc. The second is the construction decoration market, which is mainly used for the increase of housing ancillary facilities, toilets, kitchen decoration [3]. It has strong development advantages in strength, stability, machinability, nail holding power, veneering performance and bearing capacity. Artificially simulating the linear alignment of natural wood fibers by mechanical or electrostatic methods, and arranging the flakes with a certain slenderness ratio and aspect ratio in parallel in a prescribed direction or two odd-oriented paving shavings Two vertical orthogonal, hot-pressed new structural panels [4]. As an alternative to plywood and blockboard, its application fields are rapidly expanding, including floor materials, furniture, frame materials such as sofas, beds, bookcases, desks, door and window covers, heating covers, kitchen and bathroom closets, etc. [5].

In furniture manufacturing and interior decoration industry, OSSB has many advantages, such as good nail-holding performance, high impact and flexural strength, good dimensional stability, the use of environmentally friendly adhesives, excellent waterproof performance, etc. Compared with ordinary clad panels, medium density fiberboard, it is more in line with the needs of modern people for healthy home and environmental life [6]. Because of its light weight, OSSB is 20% lighter than OSB in the same volume. It is used in simple buildings and decorations such as earthquake resettlement houses, which can effectively reduce property losses and personnel injuries caused by

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house collapse [7]. At the same time, the testing methods and related industry standards of directional structure wheat straw board are becoming more and more perfect. Relevant research and experiments have explored various kinds of structural wood-based panels, and broadened the processing and application fields of directional structure wheat straw board [8]. In addition, OSSB is non-polluting and will not cause harm to the human body. The material has good air permeability and is easy to maintain indoor air freshness and humidity balance [9]. As a partition wall inside the building, it can be flexibly disassembled to meet the needs of different families for the structure of the room. LY/T2141-2013 was officially promulgated and implemented on July 1, 2013, which is of great significance for promoting the development and scientific and rational application of OSSB in China. In this paper, the application of oriented structure wheat straw board in furniture and interior decoration is studied [10].

2. Basic Characteristics of OSSB Furniture and Decoration

2.1. Structure and applicability

OSSB is a new product in the wood-based panel family. It is made of 1-year-old wheat straw and MDI adhesive as the main raw materials, processed flat and narrow long wheat straw shavings, sizing, directional paving and hot pressing. The board has stable performance and does not contain formaldehyde. It belongs to a new type of green environmental protection board. Its key technology is how to realize the vertical cutting of wheat straw, along its length, and keep the raw material at a certain length, so that the rubber drilling agent can be well distributed on the surface of wheat straw, making OSSB products have good temperature resistance. Through the reprocessing, deep processing and fine processing of directional structure straw board, the grade and availability of the board can be further improved. The only way to improve the added value and popularity of the product is to create a fine brand name through elaborate design, fine technology and meticulous work. Because the oriented structure wheat straw board has excellent performances such as strong installation and processing performance, high strength and deformation, the solid core composite door with OSSB as the core material has the characteristics of convenient processing and strong durability. Like wood materials, OSSB has strong toughness compared to other materials, and the light steel structure makes it highly resistant to impact loads and periodic fatigue damage, and has the best shock resistance.

2.2. Key points and value orientation of technological development

Owing to the low density and porous structure of OSSB material, as well as the sound insulation wall and floor system, the building of this system has good sound insulation performance. There is no common problem of impact noise transmission in concrete buildings, which is conducive to creating quiet living and working space. Because OSSB is a new kind of wood-based panel industry, it has just been industrialized, and the relevant personnel are not familiar with product inspection methods, so in the process of compiling, the simplicity of operation should be fully considered. The floor products of the project are directly decorated and processed on the surface of the directional structure wheat check board. While retaining the unique natural beauty and original ecology of the large area of wheat Cheng, the natural environmental protection of the floor is really realized. Oriented structure wheat straw board has greatly reduced warpage and creep due to its small internal stress and high strength. In addition, due to the excellent waterproof performance of the oriented structure wheat straw board, it is also possible to directly apply the cladding material or the thin wood as the furniture production board on the oriented structure wheat straw board. The “buyer market” of furniture and accessories and the industry competition pattern will not change in the short term. Therefore, OSSB furniture and decorative materials should be positioned and developed in a way that does not compete with solid wood products, but is based on low carbon and environmental protection, facing the public, and dare to compete with other wood-based panels.

OSSB enterprises should cooperate, merge or merge with furniture and decoration enterprises, reduce the intermediate links of resource transfer, expand the scale of intensive operation, improve

labor productivity and economic benefits, and reduce production and circulation costs. The cabinet exterior is coated with veneer or mixed water to break the single dull effect of material so as to cooperate with the space environment organically. Floors are overhead with wooden grilles and double-deck directional structural slabs are laid, so that the floor and ceiling have been decorated and painted with clear water, fully showing the fresh and natural characteristics of the slabs. Oriented structure wheat straw board is mainly used in the production of solid core composite doors. The whole door of the solid wood composite door is assembled and assembled by the three parts of the vertical section, the beam and the core board, and then assembled with the surface material. The directional structure of the wheat straw board for the door core board is a major innovation in the core material. The dust removal lacquer in the finishing process refers to the surface cleaning of the floor after the processing of the release tank, and the surface dust and other impurities are cleaned and then subjected to lacquer processing. The aqueous sealing primer acts to seal and enhance adhesion between the layers. Transparent putty is used to fill the surface pits to ensure surface flatness.

3. Development Strategy of OSSB Furniture and Decoration

3.1. Environmental protection, health and safety

OSSB veneer treated with thin wood or melamine-soaked paper adds diversity and aesthetics of veneer materials besides the performance advantages of the base material itself. It can be used not only for partition in cabinets and wardrobes, but also for furniture, wall panels and other parts highlighting interior decoration effects. As a new building material with wood texture, directional structure wheat straw board has good function and comfort, and can create a simple, fresh and elegant environmental effect. Especially, it combines with building components and interior decoration. Decorative board is a kind of high-grade decorative board made of natural tree species decorative veneer or artificial wood decorative veneer. It is made of thin wood chips by precise planing or rotary cutting, pasted on the base material, and used advanced gluing technology. After hot pressing, it becomes a kind of high-grade decorative board. The replacement of traditional wood-made plates and clay bricks with wheat straw plates not only protects the forest but also protects the cultivated land, realizes the recycling of waste resources, and promotes circular economy and sustainable development. By recycling wheat straw to farmers, farmers will increase their income, increase their job opportunities, and help promote the development of the rural economy. In order to standardize the production management of this product, protect the rights and interests of users, and speed up the formulation of the standard for the directional structure of wheat straw board, it can not only strengthen the production and quality management of the flooring products, but also standardize the products, which is also conducive to supervision and inspection. Emphasis on diversification in the form of structure, the formation of metal connection series, straw wood, straw porcelain, straw cloth and other soft and hard mixed series; in the function of emphasis on home and public series simultaneously, living, work, cabinet and bathroom series.

3.2. Development level orientation

According to the principle of housing material selection and considering the specific location of the house, considering the characteristics of light weight, thin board, high strength and beautiful texture of the directional structure wheat straw board, the civil engineering and decoration together can create the best benefit. The acceleration of R&D investment and the continuous progress of production technology of directional structural wheat straw board have promoted the rapid development of OSSB furniture and decoration industry, resulting in a number of indoor and outdoor application fields, and the cost-effective ratio has been greatly improved. Actively developing wood-structured buildings with Chinese characteristics. Wood-structured buildings, known as low energy consumption and green and healthy residential buildings, have incomparable advantages in heat preservation, energy saving, comfort and structural flexibility in traditional brick-concrete structures. Their performance meets the requirements of vigorously developing

energy-saving buildings in the country. It can be used as a substrate for decorative panels instead of solid wood panels. When the oriented wheat straw board is used as the substrate, the covering material can be reinforced with non-woven fabric and paper, and then cut and spliced, and glued to the particle board. In both structural and non-structural applications, OSSB can be used in place of OSB for structural materials (with light steel keels) for load-bearing/non-load-bearing walls/floor panels/roof panels. According to the Chinese OSB standard LY/T 1580-2000, it shows that the performance of OSSB products can meet the standard requirements of structural materials OSB3.

Directional structure wheat straw board is used in the force components of furniture, such as cabinet side board, load-bearing shelf, table and chair panel, box board, etc. It can solve the permanent warping deformation problem of common particleboard when it is used as furniture bearing component. Owing to the difference of wall thickness, the acquisition rate of OSSB building with light steel structure is 5%-8% higher than that of ordinary brick-concrete structure. Short construction period: using assembly construction, short construction period. Because most of the construction work is dry work, the construction has strong adaptability to climate. In the future, there will be a huge demand for directional straw boards in the market. Owing to the shortage of wood resources in China, light steel roof truss can be used to construct houses with OSSB as the structural system of wall, floor and roof. Previous OSB surface decoration methods, in principle, also apply to OSSB, that is, veneer and finishing. The veneer has printing decorative paper veneer, melamine impregnated paper veneer and so on. In the new rural construction of plastic film veneer, high-pressure decorative board veneer and resin impregnated paper veneer, the improvement of farmers' housing conditions, housing construction and transformation are one of the main contents. A large number of houses need to be rebuilt, which provides a main application field for OSSB. The performance of OSSB products can meet the performance requirements of corresponding products. The test report issued by China's wood-based panel quality inspection center shows that our OSSB products can meet the requirements of OS3 for building structural materials. In order to continuously adapt to the needs of market development, China's directional structure wheat straw board development should focus on the domestic market and open up foreign markets. The focus should be on OSSB's deep product processing to develop and process OSSB products with high added value.

4. Conclusion

In this paper, the application of directional straw board in furniture and interior decoration was studied. The rapid development of China's economy has exerted tremendous pressure on resources. The change of resource structure leads to the change of wood processing product structure. The development of non-veneer structural panels will be one of the main directions for the development of wood-based panels and new building materials in China in the future. OSSB has the characteristics of light weight, excellent performance and environmental protection. It is an ideal high-performance building structural material and can be widely used in the construction and furniture industry. This kind of environmental friendly product with high added value has stronger strength, more stable performance and more green environmental protection than all kinds of man-made panels on the market at present. Especially the formaldehyde-free property has a strong competitiveness in China's building materials and home decoration market. OSSB furniture and accessories companies are mostly private, with relatively backward management and management. Enterprises must, through reforms, innovative management systems and mechanisms, operate in accordance with the mode of modern enterprises, improve incentive mechanisms, and mobilize employees' enthusiasm for production. In the near future, China's OSSB production will embark on a path of sustained, healthy and rapid development, playing a greater role for China's forestry industry and China's economic development. In order to meet the application and promotion of OOS B in the furniture and interior decoration industry, while strengthening the development and innovation of OSSB application technology, it is also necessary to speed up the formulation of relevant standards and specifications to provide guarantee for the safe application of OSSB and the healthy development of the industry.

References

[1] Hall, John R. Estimating Fires When a Product is the Primary Fuel But Not the First Fuel, With an Application to Upholstered Furniture. Fire Technology, 2015, 51(2):381-391.

[2] Semple K E, Sambrew S, Deng J, et al. Properties of Commercial Kraft Paper Honeycomb Furniture Stock Panels Conditioned under 65 and 95 Percent Relative Humidity. Forest Products Journal, 2015, 65(3-4):106-122.

[3] Jiang B, Wang W X, Gu F, et al. Comparison of the substrate enzymatic digestibility and lignin structure of wheat straw stems and leaves pretreated by green liquor. Bioresource Technology, 2016, 199:181-187.

[4] Blaha S.Reducing the environmental footprint of interior wood doors in non-residential buildings – Part 2: Ecodesign. Journal of Cleaner Production, 2015, 109(3):247-259.

[5] Gilbert H T J, Swift J.Interior decoration: Adapting multiwell plates for high throughput mechanobiology. Biotechnology Journal, 2015, 10(10):1513-1514.

[6] Smith, Kennon M.Conditions influencing the development of design expertise: As identified in interior design student accounts. Design Studies, 2015, 36:77-98.

[7] Benlatreche Y, Nouveau C, Rémy Marchal, et al. Applications of CrAlN ternary system in wood machining of Medium Density Fibreboard (MDF). Wear, 2009, 267(5):1056-1061.

[8] Sipponen M H, Pihlajaniemi V, Sipponen S, et al. Autohydrolysis and aqueous ammonia extraction of wheat straw: Effect of treatment severity on yield and structure of hemicellulose and lignin. RSC Advances, 2014, 4(44):23177-23184.

[9] Leitner V, Lindorfer J. Evaluation of technology structure based on energy yield from wheat straw for combined bioethanol and biomethane facility. Renewable Energy, 2016, 87:193-202.

[10] Use of amino silane coupling agent to improve physical and mechanical properties of UF-bonded wheat straw (Triticum aestivumL.) poplar wood particleboard. Journal of Forestry Research, 2016, 27(2):427-431.