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Discussion on Bamboo Forming and Processing

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Abstract

Bamboo is a very high quality design material, with natural good mechanical properties, high lateral compression resistance and bending resistance. It is widely used in household manufacturing. The current bamboo processing methods include cutting and crushing in large quantities, which seriously damage the natural hollow structure of bamboo, reduce the mechanical properties, and have low utilization. In view of the above problems, processing bamboo with the same diameter into an incomplete square prism, horizontal splicing and secondary veneer can produce a high-strength composite board to improve the utilization rate of bamboo, which is of great significance for the efficient utilization of bamboo. This paper discusses the development of bamboo molding technology and the functional treatment of bamboo.

Keywords

Bamboo processing; Structural design; Molding processing technology.

1. INTRODUCTION

There are more than 1200 species of bamboo plants in the world. From the natural distribution range of bamboo plants in the world, the geographical distribution of bamboo can be divided into three regions, namely, the Asia Pacific Bamboo Region American Bamboo Region and African Bamboo Region. The uneven distribution of bamboo resources in the world has led to the unbalanced development of the bamboo industry. In addition, the resource advantages arising from the influence of many factors such as climate conditions in the geographical environment have made the bamboo industry in Asia the most developed. Among many countries in Asia, China is particularly prominent. It is one of the first countries to process and utilize bamboo resources, and also occupies a leading position in the global bamboo industry, especially in bamboo research and bamboo forest economics The development and utilization of bamboo products has reached the world's leading level. Bamboo glued laminated timber is an important direction of bamboo product development, which is the product of the development of modern bamboo processing technology. Therefore, the development of bamboo glued laminated timber in China has become the wind vane of the development of bamboo glued laminated timber in the world. The understanding of the development history of bamboo glued laminated timber can be seen by combing the development history of bamboo glued laminated timber in China.

2. EFFECT OF MOLDING ON MECHANICAL PROPERTIES OF BAMBOO

Bamboo wood-based panel is an important product used by bamboo industry. The output of bamboo wood-based panel in China has reached 1 million, accounting for about 3% of the national annual output of wood-based panel. At present, there are four main processing methods of bamboo in the production of bamboo wood-based panels: bamboo chip method, bamboo chip method, scrap method and composite method. It can be seen that at this stage,

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China still uses traditional methods for the utilization of bamboo, that is, a large number of cutting, cutting and crushing processes are used to pursue the use of the solid parts of the bamboo wall, which destroys the unique mechanical strength of the natural hollow partition structure of bamboo. The natural structure of bamboo makes bamboo have excellent mechanical properties. The internode is separated, which increases the overall horizontal compressive strength of bamboo, and the thin and hollow wall makes it have good bending resistance. The natural structure of bamboo can retain its good physical and mechanical properties. On the premise of not destroying the natural structure of bamboo, the bamboo is simply formed and processed, and then the blank and glue are combined into various hollow panels to achieve "replacing the solid with the empty", which greatly increases the utilization rate of bamboo. However, after cutting, the physical and mechanical strength of the original bamboo must be affected to a certain extent. This chapter mainly studies the influence of mechanical properties of bamboo by simple external processing, and discusses the feasibility of industrial utilization of bamboo segments formed by simple cutting without destroying the natural structure of bamboo.

3. FUNCTIONAL TREATMENT OF BAMBOO

3.1. Three prevention (mildew prevention, corrosion prevention and insect prevention) treatment

Bamboo contains more organic matter than ordinary wood, including about 2% sugar, 2.0% ~ 6.0% starch, 1.5% ~ 6.0% protein, 2.0% ~ 4.0% fat and wax, which become nutrients for some microorganisms (fungi) and insects. Therefore, when used and stored at room temperature and humidity, it is easy to cause mildew and moth. Bamboo mildew is mainly caused by parasitic fungi, among which bamboo borers are the most serious pests. According to statistics, about 10% of the world's bamboo is lost to mildew and insects every year. In order to improve the mildew and insect control performance of bamboo and realize the efficient processing and utilization of bamboo resources, scholars at home and abroad have conducted extensive research on the mildew and insect control treatment of bamboo, and formed a series of mildew and insect control treatment methods of bamboo, which mainly include the following three categories:

(1) Chemical treatment method

The chemical treatment method is mainly based on the idea of "bacteria resistance, insect resistance, sterilization and insect killing" to improve the bamboo. Mildew and insect prevention performance, that is, chemical mildew and insect prevention agents are attached to the surface of bamboo in a certain way. Or dip into the inside of the bamboo to achieve the effect of anti-mold and anti-insect. Chemical treatment methods are mildew - proof and insect - proof

Good effect, long residual time, and most of the chemical agents are toxic, easy to cause products and the environment Pollution, harm to human health.

(2) Physical processing method

Physical treatment method is mainly based on the "precipitation, decomposition of organic materials in bamboo, so that mold rot bacteria and moth loss. The idea of "denutrient source", to improve the anti-mildew and anti-insect performance of bamboo, usually adopt the treatment techniques are: high temperature method (including carbonization, boiling, steam, etc.), water immersion method, smoke method, carbonization method, far infrared method, microwave. Method and ray method, etc. High temperature method (including carbonization, boiling, steaming, etc.), far infrared method, microwave method and ray method all rely on controlling a certain temperature to degrade organic matter in bamboo. Water immersion method is to impregnate bamboo with running water (such as running water) for a period of

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time, so that the surface or internal soluble organic matter precipitates; Smoke method is to use bamboo kiln for firewood smoke heat treatment of bamboo, which not only degrades part of the organic matter in the bamboo, but also closes the grain holes in the bamboo, which is conducive to mold and insect control. Physical treatment methods have the advantages of no pollution, no residual poison, but some of the methods lack special equipment, most of the methods will affect the material property and appearance.

(3) Modification treatment method

The modified treatment method is mainly based on the conversion of organic matter in bamboo, so that mold rot bacteria and borers lose nutrition. Source "idea, enhance the bamboo mildew rot, insect control performance. Bamboo modification is a new kind of anti-mildew and anti-rot. Insect technique, such as some researchers at home and abroad using low molecular weight phenolic resin, melamine formaldehyde resin immersion

After the condensation of bamboo, the anti-mildew and anti-insect ability of bamboo was greatly improved. A teacher at Nanjing Forestry University. The experiment of liquid phase acetic acid treatment on bamboo was conducted to investigate the mildew and rot prevention effect after treatment [86]. Although the physical properties, mildew and rot prevention and insect control properties of modified bamboo were improved, it was still in the research stage, and the operation was complicated and the cost was high.

3.2. Bamboo dyeing treatment

As one of the important characteristics of bamboo products, color is an important factor to determine the impression of material consumption. In order to meet people's demand for diversified bamboo products and personalized color, it is of great significance to optimize the appearance performance of bamboo by adopting appropriate methods to improve its visual characteristics and increase its added value. In addition to some anti-mildew, anti-insect treatments have a synergistic effect on the surface color of bamboo, such as cooking to improve the whiteness of bamboo and reduce the color difference; Carbonization turns the bamboo brown or brownish-red; The smoke makes the bamboo turn black and brown, which needs special dyeing treatment for the bamboo. Bamboo dyeing is a process in which dye is chemically or physically combined with the surface of bamboo by a certain treatment method to make the appearance of bamboo have a specific and firm color. Because bamboo, like wood, is mainly composed of cellulose, semi-fiber and lignin, the dyes used for bamboo dyeing are mostly developed from wood dyeing. The dyes used for bamboo dyeing are mainly water-soluble organic dyes, which mainly include direct dyes, acid dyes, alkaline dyes and reactive dyes. Most of the direct dyes are azo dyes containing sulfonic acid, which belong to anionic dyes. Generally, they can be directly fixed on bamboo without special treatment. The binding mechanism is van der Waals force and hydrogen bonding force between molecules. Acid dyes are dyes dyed in acidic or neutral medium, containing a large number of clostridium, light or sulfonic acid, also belongs to anionic dyes, its fixation mechanism is the same as direct dyes; Alkaline dyes are salts formed by organic bases and acids such as benzo methane, azo and logotype. They are cationic dyes, which need the assistance of external conditions and are rarely used on bamboo. Reactive dye molecules contain reactive groups, which can form covalent bonds with organic compounds in bamboo and bind to the surface of bamboo. It is one of the most promising dyes at present.

4. CONCLUSION

The development of bamboo plant fiber composites based on technical, economic and industrial standards mainly shows excellent thermal, water resistance, dielectric and mechanical properties. At present, several researchers have studied the avior of natural fiber composites, focusing on thermogravimetric analysis (TGA) which shows that the thermal

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stability of the matrix polymer increases with the addition of bamboo and glass fiber. Bamboo dyeing technology is still in the preliminary stage, so it is necessary to develop the application technology of bamboo dyeing. Aiming at the "large-scale effect" of bamboo dyeing, a series of studies on the industrial production process and equipment of bamboo dyeing are carried out, so as to realize the large-scale production of bamboo dyeing. Looking into the future, the development prospect of bamboo dyeing is very broad.

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