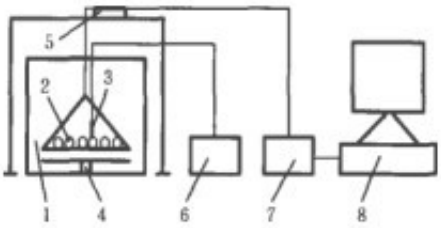
Study on Drying Technology of Wood and Wood Products



Abstract: This paper briefly describes the development of microwave drying equipment for wood and wood products, briefly introduces the principles and development status of various drying technologies, finds out the shortcomings of wood drying technology, creatively puts forward atmospheric freeze drying technology under low temperature environment, and introduces the principle and classification of atmospheric freeze drying technology, which opens up a new way for wood drying technology. New ideas for the direction of low temperature.

Key words: wood microwave drying; drying technology; low temperature; atmospheric pressure; freezing

Drying is an indispensable link in the process of wood products processing. Wood drying refers to the process of reducing the moisture content of wood to the specified value range by using the difference between the water vapor pressure inside and outside the wood in the heating process.

This process occupies an important position in the field of wood processing and manufacturing, and is also one of the processes with the highest technical content. If the wood and its wood products are treated improperly in the drying process, it will lead to cracking, discoloration and other phenomena, quality problems, resulting in wood and its wood products can not continue to use and waste.

China is a big producer of wood products, so the demand and consumption of wood is huge. According to statistics, from January to September 2013, China imported 51.486 million m3 logs, sawn timber, sheet and sleeper timber from abroad, up 15.86% compared with the same period in 2012, and the import volume maintained an upward trend. These imported timber can be used for production and life only after manual drying, but only 20% of the imported timber has been artificially dried.

The main reason is that fast drying is not possible. At present, wood drying is mainly based on

conventional drying methods. Now most common wood products are made of precious raw materials such as rosewood and logs, and the specifications of wood used are large. It is difficult to meet the drying requirements of high-quality wood products by conventional drying methods. In recent years, the study of new, efficient, energy-saving and safe drying methods has become a research hotspot of scholars all over the world.

The most energy-consuming process in wood processing is wood drying, which accounts for 40%-70% of the total energy consumption of wood products. Drying technology occupies an important position in the field of wood processing and manufacturing. At present, many experts are devoted to the research of wood drying technology. Conventional drying, microwave drying, dehumidification drying, vacuum drying, solar drying and other methods are commonly used in wood drying. There are also some combined methods used in practical production, such as conventional Steam-Dehumidification combined drying, solar heat pump combined drying and so on.

Wood microwave drying is to place wet wood in microwave alternating electromagnetic field. Under the action of frequent alternating electromagnetic field, polarized molecules in wood rotate rapidly, friction with each other and generate heat, thus heating and drying wood. Zhang Wenhui considered that the temperature gradient from inside to outside was formed in different microwave power rising section, and that the higher the moisture content, the better the ventilation, the faster and more stable the temperature gradient was formed in the thick wood with more than 50 mm.

Li Xianjun and others believe that the difference of dielectric properties of wet wood itself, the uneven distribution of microwave field strength and unreasonable process control will lead to quality defects such as cracking and carbonization after wood drying. Liu Zhijun's research on microwave drying of Masson pine wood shows that the microwave drying process can be divided into three stages: acceleration stage, constant-speed stage and deceleration stage. Among them, the proportion of constant-speed stage is the largest, and the distribution of initial and isothermal stages is relatively stable, while the temperature difference increases in the later stage.