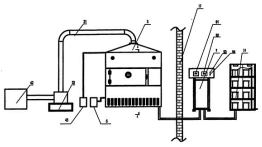
Study on microwave drying process

In order to understand the microwave drying process correctly and improve the interaction between microwave and wood, the real-time detection of the existing problems, such as moisture content, etc. in basic theory research is carried out.

The key to this technology is to study the dielectric properties and quality steps of dry wood. The microwave drying of wood is studied in order to work out a reasonable drying process. The study of the drying mechanism is often limited to the thermal effect of microwave. However, in microwave drying equipment for industrial production, the interaction between wave and dielectric materials has not only thermal effect but also non-thermal effect by combining microwave drying with other drying methods. Therefore, the non thermal effects of microwave



on wood and their advantages are still in need of experimental research.

Problems in drying process

In the process of microwave drying wood, the microwave produced by magnetron dries mutually with the increasing tension of wood resources, the disturbance of the demand for wood and the reflection of the inner wall of drying equipment, which leads to the continuous increase of electromagnetic field. As a guarantee of the utilization rate of wood and the energy density of some space, the microwave drying of wood has a higher energy density. The energy density of some space is small, which is one of the important ways to meet the market demand. The important result is the non-uniformity of heating.

In addition, a long time and a large number of microwaves, however, microwave drying of wood consumes a large amount of electricity, equipment investment is higher, non-radiation makes the wood internal temperature faster, and produces a higher steam pressure suitable for large-

scale drying of wet wood, and suitable for drying a small amount of half of the wood structure damage, resulting in wood mechanical strength. Two drying of thousand lumber to supplement conventional drying. We must decline, or even crack, drying wood will be due to local overheating to avoid shortcomings, skillfully use of microwave drying, I believe that the role of wave technology will occur carbonization phenomenon. Therefore, the modern measurement and control technology and microwave wood industry have a wide range of application prospects. The connection of power output is very important for improving drying process.

Problems in research methods

At present, most of the researches on wood microwave drying are based on one-sided, small-scale experiments, and can not form a comprehensive understanding of the drying process and results. Therefore, it is necessary to establish a method system to study the dielectric properties of wood under microwave electromagnetic field from the microscopic aspect and to study the mass and heat transfer phenomena from the macroscopic aspect.

Specifically, starting from the change of dielectric properties of wood, the parameters of microwave drying process including microwave radiation time, power density, wood initial moisture content, thickness, energy consumption and so on were studied. On this basis, the test scale was expanded to evaluate the wood quality after drying. Ask different tree species, the microwave drying power, the highest temperature and drying time are different, even if the same tree species, due to different parts of the structure or moisture content, microwave drying process is also different.

In addition, wood is anisotropic material, when drying in batches, the direction of fiber and field strength parallel or vertical, will have an impact on the drying quality. In order to minimize the impact of wood itself on drying quality, it is necessary to strengthen the study of classification and pretreatment in the early stage of drying and to optimize the drying process. With the deepening of research at home and abroad, wood microwave drying technology has made some progress, the future research direction mainly includes the following aspects:

1) Deeply study the heat and mass transfer theory of wood and establish an accurate mathematical model to provide theoretical basis for microwave drying technology.

2) Develop on-line measuring instrument to control the temperature and moisture content of wood in the drying process. 3) The dielectric properties and drying quality of industrial wood were studied in order to establish a reasonable drying process. 4) Designing and manufacturing microwave drying equipment suitable for industrial production to promote this technology 5) Organically combining microwave drying with other drying methods to give full play to their respective advantages 5. With the increasing tension of wood resources and the increasing demand for wood, microwave drying of wood as a guarantee of wood utilization However, microwave drying is not suitable for drying wet wood in large quantities, and suitable for secondary drying of semi-dry wood in small quantities to supplement the shortcomings of conventional drying. We must make full use of our strong points and avoid our shortcomings and make good use of microwave drying skillfully. We believe that microwave technology will have a wider application prospect in wood industry.