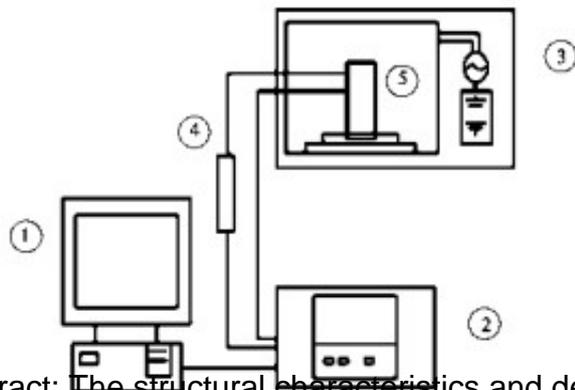


# Design of multi-layer continuous microwave pellet drying equipment

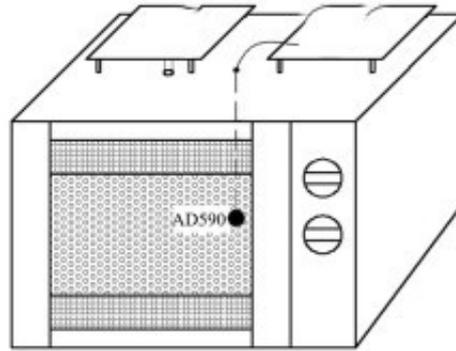


Abstract: The structural characteristics and design points of continuous microwave pill drying equipment are expounded. It is determined that the dehumidification system design of [microwave drying equipment](#) adopts the air inlet at the bottom of the outlet of the equipment and the wind at the top of the inlet end, so that the cooling air is “S” inside the equipment. Type of motion; and optimized the equipment structure by means of finite element analysis software.

The results show that the electric field distribution varies greatly in different positions of the microwave drying chamber; the frequency is greater than 1.5 GHz microwave can have a certain resonance effect; the drying chamber with trapezoidal waveguide port, and the two waveguides are arranged vertically and horizontally, the electric field distribution in the drying chamber is stronger and more uniform; the most suitable position of the drying bed arrangement is It is about 200 mm from the bottom.

Key words: [microwave drying pill](#); continuous; design; drying bed

The use of Chinese herbal medicine is a gem of Chinese national medicine. In recent years, the application of traditional Chinese medicine in China and the world has become more and more extensive, and the Chinese medicine pills have been widely developed due to their advantages such as quantitative weighing, integration with internationally accepted drug delivery methods, easy packaging, easy storage, and easy portability. . Pills need to be dried in the production process. The traditional drying method takes a long time, low efficiency, high energy consumption, easy cracking in the drying process, and uneven drying. In the modern society that advocates energy conservation and environmental protection, drying with microwave



Schematic diagram of microwave drying temperature control system

equipment is a scientific choice. .

Microwave refers to electromagnetic waves with a wavelength between 1 and 1 000 mm, that is, between 300 and 300 000 MHz. Microwave drying uses high-frequency transformation in the direction of the magnetic field to cause movement and friction of polar molecules to generate heat. The object itself becomes a heating element, and the heat conduction direction is the same as the water diffusion direction; the microwave drying speed is fast, and the dried pills have the same color and good roundness. Microwave medical drying equipment has been applied in many pharmaceutical factories in China, but the overall level of equipment is not high. Most of the equipment of microwave manufacturers lacks the characteristic design of quality and hygiene conditions in the pharmaceutical industry.

In this paper, a multi-layer continuous pill microwave drying sterilization equipment was designed and manufactured, and the equipment was optimized by finite element analysis software HFSS, so that the electromagnetic field in the drying chamber of the pill drying equipment was as strong and evenly distributed as possible.

## Conclusion

(1) The structure of the multi-layer continuous microwave pill drying equipment adopts multi-layer continuous type and adjustable conveying speed of each layer; the dehumidification system adopts the method of inlet air inlet and top exhausting at the outlet of the equipment to make the cooling wind in the equipment. Inside is an "S" type of movement. This type of construction and cooling method makes the equipment more flexible and flexible, and also makes the drying and sterilizing effect of the pills more ideal, which is leading in China.

(2) With the help of finite element software, the paper studies the influence factors of the energy distribution intensity and gradient of the microwave cavity, and points out that the rectangular waveguide with the tip is inclined, the electric field distribution on the surface of the drying chamber is relatively uniform; in the case of multiple waveguides The waveguide is arranged in a vertical and horizontal manner as the best arrangement; in addition, the fillet size should be suppressed as much as possible during the structural design; finally, the spatial position with higher electric field strength and uniform distribution should be selected according to the simulation and experimental results. To position the drying bed of the drying equipment.

(3) So far, there is no ideal method to accurately calculate the distribution density of the microwave field in the drying chamber. How to accurately measure or simulate the distribution of microwave and temperature fields in the drying chamber in the study of microwave drying pills It is also necessary to study the theory of instantaneous mass transfer heat transfer in microwave drying and the composite microwave drying technology combined with various drying modes.