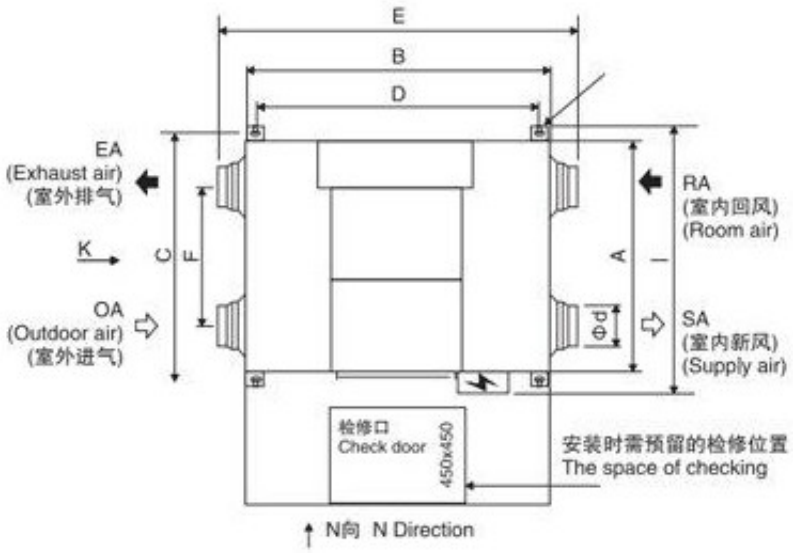
Variable function redesign of small mechanical products



In recent years, small machinery products are more and more popular with consumers due to their high comprehensive utilization rate. With the continuous expansion of production and living demand, the demand for functional diversification of small mechanical products is becoming more and more obvious. However, the existing small mechanical products on the market usually only have some fixed functions, and it is difficult to adapt to the changes in the workplace. Microwave drying machinery is a kind of equipment that can be realized by replacing system components or adjusting the connection of system components.

At present, "adaptive design" and "reconfigurable design" in the field of design research overlap with "variable function machinery" in the object of study. For adaptive design, the research focuses on the adaptability of system performance [5-6]. For reconfigurable design, modular design is usually adopted.

The existing adaptive design and reconfigurable design provide a certain basis for the conceptual design of variable function machinery, but the existing research lacks the research of variable function machinery specially for the structural change or adjustment of the system. In the previous studies, the functional and behavioral characteristics of variable-function machinery were studied, and the quantitative evaluation methods of functional coupling were proposed. In this paper, the variable function redesign of small mechanical products is studied, and the conceptual design method of such products is studied based on FBS model.

Variable function mechanical product is composed of basic function and variant function. Basic function refers to the function of the original design of the product. Variant function refers to other functions formed by the structural change or adjustment of the basic function. The process of variable function redesign and

development of small mechanical products needs a reasonable design method to provide effective design means for enterprises.

Variable-function mechanical product design is characterized by replacing system components or changing system structure to meet the needs of different functions while the main body of the product remains unchanged. In order to achieve rapid variable function redesign of existing small mechanical products, maximize customer demand, ensure the quality of product redesign, product variable function redesign system framework.

Functional models of small and medium-sized mechanical products in actual production can often be decomposed into sub-functions or functional units at different levels. In the process of functional decomposition, attention should be paid to hierarchical division to facilitate the determination of functional characteristics. Analogical reasoning should be paid attention to in structural design. For example, analogical reasoning including structure family, structure component and mechanism relationship can be carried out in case base. Analogical reasoning on the required design structure will make structural design faster and more efficient.