

Research on the Configuration Design of the ETO Product Based on Knowledge and Thing Characteristic Table*

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Abstract. This paper constructed the configuration model of the ETO product, described the configuration knowledge based on the associative architecture matrices, and proposed the configured design method based on the knowledge and the thing characteristic table. The configuration design technique of the lift machinery based on the thing characteristic table is essentially one kind of the configuration design facing the lift machinery family or the product platform. It takes the thing characteristic table as the foundation, and controls the product's configuration design combining the data management technology of the lift machinery to restrain the designers' capriciousness, thus to reduce the component types. And under the CAD/PDM system, the lift machinery can be fast designed.

Keywords: Configuration design, Thing characteristic table, Knowledge, ETO product.

1 Introduction

The configuration design technique of the lift machinery based on the thing characteristic table is essentially one kind of the configuration design facing the lift machinery family or the product platform. It takes the thing characteristic table as the foundation, and controls the product's configuration design combining the data management technology of the lift machinery to restrain the designers' capriciousness, thus to reduce the component types. And under the CAD/PDM system, the lift machinery can be fast designed. At present, the configuration design method of the lift machinery based on the thing characteristic table belongs also to the new research area in the digitized design domain. Though it has certain application in the some overseas automobile profession, its reports in the related literatures have not been seen. Jeffrey B. Dahmus et al proposed that the product family is constructed by

* This work is supported by the Zhejiang Science and Technology Project and the National Natural Science Foundation of China (No.60873106 and No.60903087).

sharing the interior exchangeable modules. First the function structures of each product are developed. After having compared the general and particular function structures, the possible modules are determined by the rule to define the possible structures. Each structure is expressed by the function-product matrix. The product frame decision is a key activity of any product's development operation. Volkswagen Company announced that the cost of the development and production in every year saves 1,700,000,000 US dollars through the effective product frame. Volkswagen Company can fully share the platform and module's performance in its four main vehicle types, like in VW, Audi, Skoda and Seat. The Ford Motor Company has also the similar sharing platform, including the general welded elements, the suspension systems, the transmission systems and so on. Messac A. et al proposed that the key of a successful product family is the general product platform. The general and variant parameters can be auxiliarily selected by introducing the punishing function of a product family (PFPP). The PFPP application can carry on the formal expression to the questions through the physical implication parameters to balance well between the versatility and the performance. Raviraj U. Nayak proposed a variant-based platform design method (VBPD), and its goal is to satisfy the performance demand in a certain scope with the smallest product family variant.

2 Constructing the Configuration Model of the ETO Product

Because the ETO product needs to be designed according to the customer special demand, its development design's cycle is long, and causes the bottleneck of reducing the product delivery cycle. Therefore, in order to satisfy the fast design request of the ETO product, the development design process of the ETO product needs to be divided into two phases, namely the development process and the process of treating the order forms for the ETO product. The development process of the ETO product is corresponding to the forming process of the new ETO product (family). It needs to carry on the development and the trial-manufacture of the new product according to the new market demand. Its cycle is usually long. The development process of the ETO product obtains the results including the product's principal models, the main documents as well as the main structures and so on. But the treating process of the ETO product's order form only needs to carry on the configuration design and the variant design according to the product's principal models, the main documents as well as the main structures. That greatly reduces the ETO product's delivery cycle, and thus can design the ETO product which meets the customer's need as soon as possible.

Figure 1 describes the product's main structure obtained in the ETO product's development process. The development steps of the ETO product include the demand analysis, the conceptual design, the rationalization, the standardization, and the establishment of the product's principal models, the main documents as well as the main structures. The product's main structure includes the optional modules and the compulsory modules. The optional modules refer to choosing some modules from the product's main structure to join to the custom-made product according to the definite rules. The compulsory modules refer to choosing some modules from the appointed